Sensory-Processing Sensitivity in the Context of the Teaching Profession and its Demands: Blessing, curse or both?

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Extended German Abstract – Ausführliche deutsche Zusammenfassung

Die vorliegende Studie verfolgt das Ziel zwei übergreifende Forschungslücken zu schließen: Zum einen sucht sie das Temperamentsmerkmal der "Hochsensitivität" (sensory-processing sensitivity; im Folgenden SPS genannt) in den Kontext der Lehrerprofessions- und Lehrerbelastungsforschung einzuführen. Zum anderen soll dessen Rolle im klinischen Setting mit Hilfe einer systematischen Analyse näher betrachtet werden.

Der Lehrerberuf ist einer der wichtigsten Berufe in unserer Gesellschaft. Lehrkräfte[1] begleiten ihre Schüler in ihrer Entwicklung über einen vergleichsweise langen Zeitraum hinweg. Diese bedeutende Rolle wurde durch verschiedene empirische Studien bereits bestätigt. Die Untersuchung von John Hattie (2009) stellt dabei eine der Bekanntesten dar, da sie die Rolle der Lehrkräfte und ihr Verhalten für den Erfolg von Schülern nochmals verstärkt betont. Gleichzeitig gilt der Lehrerberuf aber auch als äußerst komplex und sehr herausfordernd (Husén & Postlethwaite, 1994), auch im Vergleich zu anderen Berufsgruppen (Johnson et al., 2005). Diese Komplexität kann insbesondere auf die sehr unterschiedlichen Aufgaben zurückgeführt werden, die Lehrkräfte erfüllen müssen (OECD, 2014). Dabei stellt einer der herausforderndsten Aspekte des Lehrerberufs die allgemeine strukturelle Unsicherheit dar (Shulman, 1987, 2005), die gerade im strukturtheoretischen Ansatz der Lehrerprofessionsforschung fokussiert wird (Helsper, 2014; Kiel & Pollak, 2011). Zusätzlich wurden aber auch zahlreiche weitere Charakteristika als herauffordernd und spezifisch für den Lehrerberuf beschrieben (e.g., Rothland, 2013), wie beispielsweise unter anderem die öffentliche Wahrnehmung von und Meinung über den Lehrerberuf, die von Lehrkräften oft als weniger positiv wahrgenommen wird (Lehr, 2014). Betrachtet man diese diversen Anforderungen und Ungewissheitsaspekte, verwundert es nicht, dass diese zu erhöhtem Belastungserleben bei den Lehrkräften führt. Verschiedene Studien machten bereits auf die Situation der Lehrkräfte aufmerksam und untersuchten zahlreiche Faktoren, die zu diesem Stresserleben führen (u.a. Albrecht, 2016; Hillert & Lehr, 2004; Lehr, Koch, & Hillert, 2010; Schaarschmidt, 2004). Als Teil des Persönlichkeitsansatzes (vgl. Cramer, 2016; Mayr, 2014) wurden zumeist allerdings Merkmale analysiert, die eng mit der Persönlichkeit von Lehrkräften

[1] Aus Gründen der Lesbarkeit wird in dieser Zusammenfassung der Begriff *Lehrkräfte* anstatt *Lehrerinnen* und *Lehrer* verwendet. Dasselbe gilt für die Begriffe *Schüler* und *Teilnehmende*, welche an dieser Stelle entsprechend für die Begriffe *Schülerinnen* und *Schüler* sowie *Teilnehmerinnen* und *Teilnehmer* verwendet werden. Angesprochen sind jeweils sowohl männliche als auch weibliche Personen.

zusammenhängen, wie beispielsweise die Big Five Persönlichkeitsmerkmale (McCrae & Costa, 2008) oder aber Merkmale der Interessenstheorie nach Holland (1997). Auch dysfunktionale Kognitionen und Stressbewältigungsstrategien (Hillert et al., 2016; Lehr, Schmitz, & Hillert, 2008), oder auch Selbstwirksamkeit (Aloe, Amo, & Shanahan, 2014; Friedman, 2003) stellten sich als bedeutende Einflussfaktoren heraus. Obwohl einige Studien auch verschiedene kontextuelle Einflussfaktoren untersucht haben, wie beispielsweise die Belastung durch Lärm oder bautechnische Bedingungen (Kyriacou, 2001; Nieskens, 2016) so liegt der Fokus der Forschung bisweilen bei der Untersuchung personenbezogener Variablen.

Betrachtet man gleichzeitig aktuelle Entwicklungen im Forschungsbereich der Psychologie, wird die Annäherung an eine interaktionelle Betrachtungsweise sehr deutlich (Lucas & Donellan, 2009; Wagerman & Funder, 2009). Trotz der bereits erfolgten Übertragung dieser Sichtweise auf das Feld der Belastungsforschung (zu sehen beispielsweise in dem Vulnerabilitäts-Stress Modell (Monroe & Simons, 1991) und dem transaktionalen Stressmodell (Lazarus & Folkman, 1984)), besteht im Bereich der Lehrerprofessionsforschung in dieser Hinsicht noch ein Forschungsdefizit.

Die hier beschriebene Studie hat zum Ziel, diese Forschungslücke hinsichtlich der interaktionellen Betrachtung von Person und umweltspezifischen Aspekten im Kontext des Lehrerberufs zu schließen, indem sie das Temperamentsmerkmal der Hochsensibilität (E. N. Aron & Aron, 1997) einführt. Es bietet sich als ein geeignetes Merkmal hierfür an, da es durch die Beschreibung inter-individueller Unterschiede in der Verarbeitung von internen und externen Reizen eine Schnittstelle zwischen beiden Entitäten darstellt.

Das Konstrukt SPS wurde im Jahr 1997 von Elaine N. Aron und Arthur Aron in den Forschungsbereich der Persönlichkeitspsychologie eingeführt. Auf Grundlage bereits existierender wissenschaftlicher Theorien, wie beispielsweise der Theorie der Verhaltenshemmung von Gray (1981) und Kagan (1994) als auch die Stimulus screening-Theorie von Mehrabian (1991), wurde es als Temperamentsmerkmal beschrieben, welches genetisch determiniert ist und mit Hilfe der entwickelten Highly Sensitive Person Scale (HSP Scale; E. N. Aron & Aron, 1997) gemessen werden kann. Es wird von einer Normalverteilung in der Gesamtbevölkerung ausgegangen, in der nur eine Minderheit (ca. 30%) vergleichsweise hohe Werte in der Skala erreichen und als hochsensibel betrachtet werden können (Lionetti et

al., 2018; Pluess et al., 2018). In Form von zahlreichen empirischen Studien konnte es zusätzlich von anderen Persönlichkeitsmerkmalen, wie beispielsweise der sozialen Introversion, Emotionalität oder Neurotizismus abgegrenzt werden (vgl. Ahadi & Basharpoor, 2010; E. N. Aron, Aron, & Davies, 2005; Sobocko & Zelenksi, 2015). Insbesondere lassen sich vier verschiedene Charakteristika von hochsensiblen Personen (HSP) identifizieren: Eine tiefere Informationsverarbeitung, Verhaltenshemmung, eine erhöhte emotionale Reaktivität sowie die verstärkte Wahrnehmung von (subtilen) Reizen (vgl. E. N. Aron, Aron, & Jagiellowicz, 2012). Auch Zusammenhänge mit Variablen negativen Affekts wurden bereits generiert (für eine Übersicht, siehe Greven et al., 2018 und Wyller, Wyller, Crane & Gjelsvik, 2017), die insbesondere auf mögliche negative Kindheitserfahrungen (E. N. Aron et al., 2012) sowie auf schneller erreichte und intensiv erlebte Überreizbarkeit zurückgeführt werden.
Die Entwicklungen der letzten Jahrzehnte beinhalteten verschiedene Theorien aus divergenten Forschungsrichtungen, die jeweils einen Fokus auf divergente Reaktionen auf Umgebungsreize legten. Als Reaktion auf diese grundlegenden Ähnlichkeiten wurde erst kürzlich eine Rahmentheorie eingeführt, Environmental Sensitivity (Pluess, 2015). Hiermit einher ging auch der verstärkte Schwerpunkt auf positive Effekte positiver Umgebungsreize, die insbesondere in der Theorie Vantage Sensitivity im Zentrum steht.

Die zwei bereits genannten übergreifenden Ziele der aktuellen Studie aufgreifend, bietet die Einführung von SPS durch seine spezifischen Eigenschaften nicht nur vielversprechende Einsichten in den Lehrerberuf, sondern auch in den klinischen Kontext (vgl. Villiers, Lionetti, & Pluess, 2018). Beide Aspekte repräsentieren signifikante Forschungslücken mit Bezug auf die Forschung zu SPS (Greven et al., 2018).
Darauf aufbauend verfolgt die aktuelle Studie die vier übergeordneten Ziele bzw. Forschungsfragen:

- Kann die Validität des Konstrukts in der aktuellen Studie bestätigt werden und erfolgreich von anderen Stress-relevanten Konstrukten, wie beispielsweise Depression, Angst und Stress, abgegrenzt werden?
- Nehmen hochsensible Lehrkräfte die verschiedenen Charakteristika des Lehramts anders wahr als nicht-hochsensible Lehrkräfte und wie hängen diese Beziehungen mit Stress zusammen?

- Wie hängt SPS mit verschiedenen psychischen Symptomen und Krankheitsbildern zusammen und kann die Existenz der Vantage Sensitivity Theorie in dieser Studie auch im klinischen Kontext bestätigt werden?
- Wie unterscheiden sich hochsensible Lehrkräfte einer klinischen und einer nicht-klinischen Stichprobe voneinander bezüglich der Variable SPS sowie anderen Stress-relevanten Konstrukten und kann ein übergreifendes Modell von Lehrerbelastung empirisch bestätigt werden, welches auch das Konstrukt SPS beinhaltet?

Diese vier allemeinen und übergreifenden Forschungsfragen repräsentieren die zwei Ziele der aktuellen Studie, die drei Forschungsrichtungen miteinander verbindet: Auf der einen Seite soll SPS als ein zusätzliches Temperamentsmerkmal in die Forschung zur Lehrerprofessionalität und der Lehrerbelastung, als zwei doch relative unabhängige Forschungsrichtungen, eingeführt werden. Auf der anderen Seite soll SPS im klinischen Kontext systematisch näher analysiert werden, welches eine wichtige Forschungslücke im Bereich der Forschung zu SPS schließt (Greven et al., 2018).

Die Daten der Studie wurden über das übergeordnete Projekt “Risiko-Check für das Lehramt” gesammelt. Im Besonderen wurden Informationen von zwei Stichproben generiert: Einer nicht-klinischen Stichprobe (n = 194) mit Lehrkräften, die aktiv im Schuldienst tätig waren, und einer klinischen Stichprobe (n = 130) mit Lehrkräften, die zur Zeit der Datenerhebung stationär in der psychosomatischen Schön Klinik Roseneck in Prien am Chiemsee behandelt wurden. Beide Gruppen wurden gebeten einen identischen Fragebogen auszufüllen, der sowohl persönlichkeitsbezogene als auch umgebungsspezifische Aspekte abfragte. Bezüglich der Persönlichkeitsvariablen wurde SPS, Selbstwirksamkeit (Jerusalem & Schwarzer, 1999), dysfunktionale Kognitionen (Trageser, 2010), Stressbewältigungsstrategien (Lehr, Schmitz, & Hillert, 2008) und das Wohlbefinden (in Form von Depression, Angst und Stress; Nilges & Essau, 2015) abgefragt. Die Daten zu den angesprochenen Umgebungsvariablen enthielten eine selbst entwickelte Skala zu den Erwartungen sowie Charakteristika des Lehrerberufs nach Rothland (2013) und eine Kooperationsskala (Fussangel, 2008). Zusätzlich wurde eine weitere Skala entwickelt, die darauf abzielte, bestimmte Charakteristika des Merkmals SPS im Kontext des Lehrerberufs zu messen. Insbesondere zielte diese auf die tiefere Informationsverarbeitung und die erhöhte emotionale Reaktivität ab. Eine zusätzlicheVariable an der Schnittstelle

zwischen Arbeits- und Privatleben war die Skala zur Messung von Work-Life Balance (Syrek, Bauer-Emmel, Antoni, & Klusemann, 2011).
Während die nicht-klinischen Daten dank der über den Bayerischen Beamtenbundes sowie den Bayerischen Lehrer- und Lehrerinnenverbands geschalteten Teilnahmeaufrufe online erhoben werden konnten, fand die Ansprache der Patientinnen und Patienten in der Klinik persönlich durch Projektmitarbeiter statt.
Zusätzlich waren für eine kleinere Untergruppe der klinischen Stichprobe ($n = 65$) auch weitere klinische Daten verfügbar. Diese umfassen Informationen zu den jeweiligen Haupt- und Nebendiagnosen sowie zu zusätzlichen Fragebögen, die verschiedene Symptome und Krankheitsbilder sowie Variablen zur Messung von klinischen und therapeutischen Erfolgen beinhalteten.
Die statistischen Analysen beinhalten verschiedene Ansätze der induktiven Datenauswertung, wie beispielsweise Mittelwertsvergleiche zwischen zwei oder mehr Gruppen (u.a. t-tests bei unabhängigen Stichproben oder ein-faktorielle Varianzanalysen), Zusammenhangsmaße (u.a. Korrelationskoeffizienten nach Pearson oder Spearman), sowie Analysen von ähnlichen Gruppen von Teilnehmenden (u.a. Latente Klassenanalysen oder Cluster-Analysen), um nur einige Beispiele zu nennen. Die statistischen Analysen wurden mit Hilfe des Statistikprogramms SPSS von IBM und MPlus durchgeführt. Für die Analyse des entwickelten Modells wurde auf Strukturgleichungsmodelle und das Zusatzprogramm SPSS Amos zurückgegriffen.

Vor dem Beginn der Datenerhebung wird, aufbauend auf aktuelle Entwicklungen im Bereich der Statistik, insbesondere auf fehlende Werte und mögliche konfundierende Variablen geachtet (Greenland & Morgenstern, 2001) sowie darauf, dass die Voraussetzungen der jeweiligen parametrischen statistischen Tests erfüllt sind (Field, 2009). Sollte das nicht der Fall sein, wird auf nicht-parametrische Tests zurückgegriffen und zusätzlich das Ergebnis der parametrischen Analysemethode mit angegeben (Elliott & Woodward, 2007).

Basierend auf der grundlegenden Gliederung der vier übergeordneten Forschungsfragen, die weiter oben genannt wurden, können die folgenden wichtigsten Ergebnisse als wie folgt zusammengefasst werden:

Einleitende Ergebnisse bestätigen statistisch signifikante Unterschiede zwischen den beiden Stichproben auf allen relevanten Variablen gemäß der gestellten Hypothesen. Insbesondere erreicht die klinische Stichprobe im Durchschnitt höhere Werte auf allen dysfunktionalen Kognitionen sowie denen der Stressbewältigungsstrategien, die als dysfunktional interpretiert werden. Weiterhin nehmen sich die Teilnehmenden der klinischen Stichprobe durchschnittlich als weniger selbstwirksam war und berichten von einer als weniger ausgeglichen wahrgenommenen Work-Life Balance. Außerdem unterscheiden sich die erreichten Mittelwerte auf der HSP-Skala zwischen den beiden Stichproben signifikant. Des Weiteren weisen die Ergebnisse der exploratorischen Faktorenanalyse auf Grundlage der neu entwickelten Skala zu den Charakteristika des Lehrerberufs auf eine Anzahl von Eigenschaften des Lehrerberufs hin, welche in Teilen die theoretischen Annahmen bestätigen können. Unter diesen Eigenschaften befinden sich unter anderem eine Skala zur Offenheit der Aufgabenstellungen, zum fehlenden Feedback und Karrieremöglichkeiten sowie zur Balance zwischen Privatem und dem Beruf im Alltag.

Im Zuge der **ersten Forschungsfrage** kann die aktuelle Studie die Validität des Konstrukts SPS bestätigen. Insbesondere wird, trotz der replizierenden Ergebnisse bezüglich des Zusammenhangs zwischen den Variablen, mit Hilfe von explorativen Faktorenanalysen festgestellt, dass sich SPS von Depression, Angst und Stress weitestgehend abgrenzen lassen. Konstruktüberlagerungen innerhalb der drei Variablen Depression sind deutlicher zu erkennen als diejenigen zwischen diesen drei Variablen und SPS. Darüber hinaus werden erste Tendenzen der Existenz von allgemein akzeptieren Faktoren (bzw. Facetten) des Konstrukts erkennbar, trotz fehlender eindeutiger Passung aller dieser Modelle zu den Daten dieser Studie. Die drei Sensitivitätsgruppen (Hoch Sensitive, Medium Sensitive und Niedrig Sensitive), die in der Studie als Grundlage für vergleichende Analysen genutzt werden, müssen allerdings auf theoretischer Basis und auf Grundlage der Daten der nicht-klinischen Stichprobe zugeordnet werden. Die so generierten Cut-Off-Werte werden anschließend auf die klinische Stichprobe übertragen. Verantwortlich für dieses Vorgehen sind Ergebnisse, welche auf fehlende Passung zwischen den Daten der nicht-klinischen Stichprobe der Studie und eine Lösung mit einer, zwei, drei oder vier Klassen schließen lassen. In beiden Stichproben lassen sich allerdings auf diesen Zugang hin Sensitivitätsgruppen ableiten, die sich hinsichtlich der HSP-Sala signifikant voneinander unterscheiden und als akzeptierte Grundlage für weitere statistische Analysen interpretiert werden können.

Die **zweite übergeordnete Forschungsfrage** hat zum Ziel die Wahrnehmung der verschiedenen Charakteristika des Lehrerberufs zu analysieren und der Frage nachzugehen, ob sich hochsensible Lehrkräfte von anderen Lehrkräften unterscheiden. Die Ergebnisse bestätigen, dass hochsensible Lehrkräfte sich stärker den Schülern verbunden fühlen, die Hilfe brauchen. Gleichzeitig nehmen sie die beruflichen Eigenschaften vermehrt wahr, die mit vergleichsweise großer Flexibilität und Offenheit einhergehen, wie beispielsweise die Grenzenlosigkeit der Aufgabenstellung, die verschiedenen Erwartungen, fehlendes Feedback und eine ausgeglichene Work-Life Balance. Weiterhin mediiert SPS den Zusammenhang genau dieser Charakteristika mit Stress. Aufgrund signifikanter Assoziationen von SPS und dysfunktionalen Kognitionen sowie als dysfunktional geltende Stressbewältigungsstrategien wird angenommen, dass diese Variablen für diese Zusammenhänge verantwortlich sein könnten. Hochsensible Lehrkräfte fühlen sich gleichzeitig genauso erfolgreich wie solche mit einem niedrigeren SPS-Level.

Die systematische Analyse von SPS innerhalb des klinischen Kontexts stellt die Absicht des **dritten allgemeinen Forschungsinteresses** der vorliegenden Arbeit dar. Wie bereits zuvor angesprochen, erreichen die Teilnehmenden der klinischen Stichprobe durchschnittlich höhere Werte auf der HSP-Skala als Lehrkräfte der nicht-klinischen Stichprobe. Dies lässt sich auch in der vergleichsweise größeren hochsensiblen Gruppe bzw. der vergleichsweise kleinen niedrig-sensiblen Gruppe in dem klinischen Datensatz erkennen. Zusätzlich werden bereits bestehende Befunde bestätigt, welche insbesondere die Bedeutung von Angst- und depressiven Störungen für HSPs hervorheben. Trotz der fehlenden statistischen Signifikanz des Assoziationstests, ist des Weiteren auch eine Tendenz in diese Richtung in den gegebenen Haupt- und Nebendiagnosen der Teilnehmenden der klinischen Stichprobe erkennbar. Durch die gefundenen Zusammenhänge mit den beschriebenen dysfunktionalen Kognitionen und Stressbewältigungsstrategien liefert die aktuelle Studie zusätzlich auch empirische Hinweise für die vor Kurzem theoretisch suggerierte kognitive Reaktivität bei Hochsensiblen, die als möglicher zugrundeliegender Mechanismus fungiert. Eine weitere wichtige Erkenntnis in diesem Zusammenhang ist die empirische Bestätigung der Existenz der Vantage Sensitivity Theorie in der aktuellen Studie. Insbesondere weisen die Ergebnisse auf einen signifikanten positiven Zusammenhang zwischen SPS und den Veränderungswerten (zwischen Aufnahme und Entlassung) der Patienten hin. Dies trifft schwerpunktmäßig die bereits angesprochenen Krankheitsbilder, die am ehesten mit SPS in Verbindung gebracht werden (insb.

Angststörungen und Depression). Trotz fehlender statistischer Signifikanz in einigen Analysen ist eine solche Tendenz auch bei anderen Krankheitsbildern erkennbar.

Die **vierte, finale Forschungsfrage** kann in zwei Unterziele aufgeteilt werden: Zum einen wird Evidenz für die Existenz verschiedener Sensitivitätstypen sowie deren Unterschiede hinsichtlich anderer Stress-bezogener Variablen sowie der Wahrnehmung der Charakteristika des schulischen Alltags generiert. Zum anderen wird das in dieser Studie entwickelte Modell evaluiert, welches das Ziel verfolgt, die Entwicklung von Stress unter Rücksichtnahme von SPS, populären theoretischen Stressmodellen, den verschiedenen besonderen Charakteristika des Lehrerberufs sowie den in dieser Studie generierten Ergebnissen zu erklären.

Mit Bezug auf den ersten Teil weisen die Ergebnisse auf die Existenz von drei Sensitivitätstypen hin, wenn die Analyse auf Grundlage der Gruppe der Hochsensiblen aus beiden Stichproben durchgeführt wird: Während eine der drei Gruppen eher allgemein hohe Werte über alle Items der HSP-Skala erreicht, so kann bei den anderen beiden Typen jeweils ein Fokus erkannt werden. Dieser liegt entweder bei der Facette Aesthetische Sensitivität oder bei den beiden verbleibenden Facetten Geringe Reizschwelle sowie Schnellere Erregbarkeit (im Sinne von Überreizbarkeit). Interessanterweise befindet sich die Mehrheit der klinischen Stichprobe in der hochsensiblen Gruppe mit dem Fokus auf der Ästhetischen Sensitivität, währen die nicht-klinischen hochsensiblen Teilnehmenden zu einem großen Teil zu der Gruppe zugeordnet werden, die über die Facetten hinweg erhöhte Werte aufweisen. Gleichzeitig bestätigen die Ergebnisse, dass sich die drei Sensitivitätstypen auch hinsichtlich der Strategien zur Stressbewältigung, der dysfunktionalen Kognitionen sowie des Erfolgs einer Work-Life Balance unterscheiden und zwar in einer Weise, dass die Ästhetisch sensiblen hochsensiblen Teilnehmende durchschnittlich höhere Werte auf den Variablen erreichen, die als funktional gelten und niedrigere Werte auf den Aspekten, die als dysfunktional gelten. Der Unterschied wird jeweils im Vergleich mit einer oder beiden der verbleibenden Gruppen statistisch signifikant.
Betrachtet man das zweite Ziel dieser letzten Forschungsfrage, so weisen die Ergebnisse auf eine fehlende Passung zwischen dem Gesamtdatensatz der beschriebenen Studie und dem aufgestellten Modell hin. Dennoch bieten die standardisierten Regressionskoeffizienten bereits erste Hinweise darauf, dass SPS eine wichtige Rolle in der Erklärung von Stress spielen kann,

insbesondere im Vergleich zu den Variablen, die bis zum jetzigen Zeitpunkt den Fokus der Analysen darstellen.

Aus den beschriebenen Befunden ergeben sich zahlreiche praktische, theoretische und wissenschaftliche Implikationen sowohl für den Bereich der Lehrerprofessions-, den der Lehrerbelastungsforschung, als auch den Bereich der Forschung zu SPS. So kann davon ausgegangen werden, dass eine Integration von Persönlichkeitsvariablem im Allgemeinen, aber auch SPS im Speziellen, einen statistischen und auch praktischen Mehrwert darstellen können, wenn es um weitere Forschung im Bereich der Lehrergesundheit geht. Des Weiteren haben die hier generierten Ergebnisse signifikante wissenschaftliche Konklusionen für die weitere Forschung im Bereich der Hochsensitivität, da sowohl erste empirische Befunde für theoretische Hypothesen generiert als auch neue Thesen aufgestellt werden konnten.

Abschließend wir die Qualität der dargestellten Studie reflektiert und kritisch evaluiert. Unter den Limitationen befinden sich unter anderem die einmalige, querschnittliche Erhebung der Daten, die relative geringe Stichprobengröße, insbesondere mit Bezug auf die klinischen Stichprobe und die zusätzlichen klinischen Daten, sowie die fehlende Erhebung von emotionaler Affektivität und damit zusammenhängend der Emotionsregulation. Auf diesen Kritikpunkten wurden weiterhin Hinweise für zukünftige Studien entwickelt. Diese sollten beispielsweise versuchen, die hier generierten Ergebnisse an einer unabhängigen und größeren klinischen zu replizieren, weitere Variablen und Aspekte von SPS mit in ihre Erhebungen aufnehmen, sowie den Einsatz und Verlauf von psychischen Erkrankungen im Kontext des Lehrerberufs in einem längsschnittlichen Design unter Berücksichtigung von SPS detaillierter zu analysieren.

Abstract

The present study has two main purposes: First, investigating the role of sensory-processing sensitivity (SPS), describing inter-individual differences with regard to people's sensitivity to positive and negative environmental stimuli through a deeper level of information processing (E. N. Aron & Aron, 1997), in the teaching work place. Second, it aims at revealing further insight into the association between SPS and different mental disorders as well as variables of therapeutic success.

The teaching profession is widely accepted as being complex and highly demanding with many expectations and requirements, so the high level of stress found across teachers is thus not surprising. Nonetheless, teachers can only efficiently fulfill their important tasks and have a positive influence on students if they are mentally healthy. Given empirical findings supporting an increased stress level across teachers, numerous studies have investigated the conditions and processes behind the onset of mental ill-health and developed various prevention programs to support teachers in dealing with their perceived stress. Looking through the research area, a clear focus on behavior and personality-related characteristics of teachers is present, including, for example, various dysfunctional cognitions, coping behavior or the Big Five personality traits (McCrae, 2009). Although other studies consider environmental aspects of the work place as well, such as noise or schedules, the integration of these two entities is still a research gap. This is true despite recent developments emphasizing the perspective of person-environment interactions, particularly in the field of stress. The present study takes up this gap by introducing the temperament trait of SPS into the field of teacher professionalism and health research, representing a holistic way of analyzing person-environment interactions as it focuses on individuals' reactivity to certain environmental conditions and stimuli.

Embedded into the project "Risiko-Check für das Lehramt" ("Checking risks of the teaching profession"), two teacher samples participated in the study: a non-clinical sample of teachers (n = 194), who were actively teaching in the school context and a clinical sample of teachers (n = 130), who received inpatient treatment and were diagnosed with mental disorders during the data collection process. Both groups filled out the same questionnaire, which included different scales measuring aspects of the teaching environment (e.g., workplace characteristics and expectations, or a scale measuring collaboration) and personality-related variables of teachers (e.g., dysfunctional cognitions, self-efficacy, coping strategies, and SPS). For a small sub-group

of the teachers in the clinical sample, additional clinically-relevant data, such as measures of therapeutic success or additional measures of mental disorders, was also available.

In line with the **first goal** of the study, results reveal further evidence for the validity of the construct: SPS was successfully differentiated from other variables measuring psychological well-being, including Depression, Anxiety, and Stress.

The **second aim** represents the investigation of the role of the temperamental trait of SPS in the teaching context. Of particular interest are the perception of certain workplace-demand characteristics unique to this profession (Rothland, 2013) and the extent to which certain characteristics related to SPS are activated in teachers in their everyday lives. Findings suggest that highly sensitive teachers feel more attuned to the students, who need help, but, at the same time, have more difficulties with regard to the characteristics that are very open and include a certain degree of flexibility. Those are for example, maintaining an efficient work-life balance, dealing with their tasks and deciding when certain demands are fulfilled, lack of feedback, and the various expectations teachers are confronted with. In spite of these difficulties, they perceive themselves as similarly successful as non-highly sensitive teachers. Additionally, SPS mediates the relationship between different demands and teachers' perceived stress. Three ways this is possible are an increased frequency of applying dysfunctional cognitions, coping strategies, and lower self-efficacy.

Research questions in line with the **third general goal** of the present study include a more detailed investigation of the association with clinically relevant variables; the difference between mentally ill teachers and those teaching actively; and evidence for the presence of the Vantage Theory framework (Pluess, 2017) in clinical contexts, describing increased effect of positive and supporting environments, such as those found in therapeutic interventions. In general, participants in the clinical sample reach higher mean scores on the scale measuring SPS than participants in the non-clinical sample. Additionally, investigating the symptoms of teachers in the clinical sample, highly sensitive teachers show more severe symptoms of anxiety and depressive disorders. Finally, in line with one of the hypotheses stated in this context, results support the presence of vantage sensitivity in this study. While almost all patients show improvements in their general functioning and clinical global impression at release (i.e., comparing it to their levels at admission), patients with high levels of SPS are found to benefit

even more from the treatment, on average, than patients with lower levels of SPS. This is true for the majority of symptoms that are associated with SPS, which include phobic anxiety, anxiety, and depressive disorders.

Finally, the **fourth objective** of the present study aims at broadening the findings by investigating the hypothesis of the existence of different sensitivity types. Then, all theoretical and empirical models as well as existing findings and those generated in the present study are taken together in order to develop an overarching model for the development of stress in teaching, including SPS as one facet. Results of a cluster analysis including the highly sensitive teachers of both samples disclose the existence of three sensitivity types that differ significantly with regard to their core areas of certain characteristics of SPS. While one group reaches comparably high scores across facets, the remaining two sensitivity types show a particular focus, either the facet Aesthetical sensitivity or the two factors Low sensory threshold and Ease of excitation. The majority of the clinical sample is found to be more aesthetically sensitive, whereas most teachers in the nonc-clinical sample are assigned to the group with comparably higher scores across facets. Furthermore, these sensitivity types differ with regard to their work-life balance and dysfunctional cognitions as well as coping strategies in a such way that the Aesthetically sensitive type reach mean scores that can be interpreted as most functional when compared to the remaining types. Finally, with regard to a general model of stress development for teaching, despite the final model not reaching statistical indices indicating a fit to the data of the present study, comparisons of regression weights reveal support for the significant role of SPS in comparison to already-established variables.

In summary, the findings of the present study close various research gaps and have multiple implications. First, they reveal evidence for the fact that SPS could add valuable information when implemented into research on teacher professionalism and teacher stress, which has diverse implications for the political, administrational and individual level. Secondly, they broaden the research field of SPS by revealing more insight into the associations between SPS and mental ill-health as well as evidence in support of vantage sensitivity, suggesting that patients with higher levels of SPS benefit more from therapeutic interventions than patients with lower levels. Limitations of the present study are discussed critically and suggested approaches for further research studies are described.

Table of content

1. Introduction

The teaching profession represents one of the most important professions in society. Teachers accompany their students' lives over a long period of time and can significantly influence their behavior, attitudes, abilities, and performance, as well as set the foundation for their future lives as responsible citizens. This has also been empirically supported, for example, by the popular study by Hattie (2009), whose findings revealed further evidence for the importance of teachers and their actions. At the same time, however, the teaching profession represents a very complex and highly demanding profession (Husén & Postlethwaite, 1994), particularly when compared to other professions and occupations (Johnson et al., 2005). This is mainly due to the highly diverse task they have to fulfill (OECD, 2014), often defined as a complex "process" in the scientific literature (Husén & Postlethwaite, 1994, p. 6136). The central challenging aspect is the underlying uncertainty of the profession (Shulman, 1987, 2005), which has been addressed by the structural-theoretical approach within the context of teacher professionalism (e.g., Helsper, 2014). This influences the connection between teachers' intentions and the resulting effects in particzlar, leading to a limitation and uncertainty of educational action in general (Helsper, 2014; Kiel & Pollak, 2011; Lortie, 2002; Shulman, 1991). Teaching can therefore only be interpreted as "an offer to the students" [2] (Helmke & Schrader, 2014, p. 149), which "does not necessarily lead to *effects*" (Helmke, 2009, p. 74) in the form of success in students as they are influenced by numerous additional variables. The resulting "complex interactive dynamics" (Helsper, 2016, p. 103) further lead to tension that is difficult to deal with for teachers and represent the main goal in line with teacher professionalism (Kiel & Pollak, 2011). But it is not just the structural uncertainty that represents a challenge for teachers, but rather even more aspects of the workplace have been described in the literature, such as the general lack of feedback about long-term effects (Rothland, 2013) and the public's view of the profession, which is not perceived as positive by teachers (Lehr, 2014). Highly related is the fact that almost all citizens have visited school as students in their lives, leading to them perceiving themselves as being able to judge teachers and their behavior (Rothland, 2013).

Considering the important role of teachers for their students and, at the same time, the numerous demands teachers have to fulfill within this aforementioned context of uncertainty (Rothland, 2013; Weiß, Schramm, & Kiel, 2014a, 2014b), the recently increased number of studies

[2] In order to offer clear evidence for the use of direct quotations, all translated direct quotations are also indicated by quotation marks.

investigating psychological well-being is not unanticipated (Hillert & Lehr, 2004). The study by Schaarschmidt (2004) in particular caused a sensation as it was one of the first studies pointing out the demanding nature of the profession and the strain perceived by teachers; numerous investigations have followed since then (Albrecht, 2016; Lehr, Koch, & Hillert, 2010; K. Lüdtke, 2017). Consequently, the main focus in research on teacher stress has been on the way teachers deal with these challenges, focusing on their individual behavioral and cognitive processes. Studies in this line of research can be summarized into the personality approach of teacher professionalism research (Cramer, 2016; Mayr, 2014), which investigates the role of a "group of relatively stable dispositions that are important with regard to behavior, success, and the well-being in the teaching profession" (Mayr & Neuweg, 2006, p. 183). In addition to the Big Five personality traits (McCrae & Costa, 2008), the Vocational Personalities by Holland (1997) have been analyzed in this context. Similarly, additional personal characteristics have been found to contribute to the onset mental ill-health in teachers, including dysfunctional cognitions and different coping strategies (Hillert et al., 2016; Lehr, Schmitz, & Hillert, 2008), Tolerance of uncertainty (König & Dalbert, 2004, 2007), or self-efficacy with regard to work-related situations (Aloe, Amo, & Shanahan, 2014; I. A. Friedman, 2003). A second approach addressing the issue of preparing future teachers for these challenges, demands, and expectations they have to fulfill in their work life is applied by political, research and educational institutions that aim at creating standards and developing programs (Bromme, 1997a, 1997b; Darling-Hammond & Bransford, 2005; KMK, 2014; NBPTS, 2015). One important approach in the context of teacher professionalism following this line of research is the competence-oriented approach (Baumert & Kunter, 2011), which suggests aspects of professionalization in teaching in four factors: knowledge and skills, professional values, beliefs, and goals and motivational orientation.

Although some other studies have investigated some environmental challenges for teachers, including working conditions such as the school buildings and their surroundings (Kyriacou, 2001; Nieskens, 2016), the focus of this research area has most notably been on individual differences across teachers. However, considering recent developments of the person-situation debate in the field of psychology, there is increasing agreement with the interactional approach (Lucas & Donellan, 2009; Wagerman & Funder, 2009), suggesting that personality traits interact with the environment and lead "toward a more complete understanding of why people do what they do" (Furr & Funder, in press, p. 1). This can also be seen in various models on the

development of stress and mental ill-health, two of which also form the theoretical background of the present study. For example, the diathesis-stress model suggests the onset of mental illness being due to certain vulnerability factors and some particularly stressful experiences (Monroe & Simons, 1991; Wittchen, Jacobi, Klose, & Ryl, 2010). This model was further expanded by Wittchen and Hoyer (2011), who further added modifying factors such as dysfunctional cognitions and coping strategies to their model. Similarly, the transactional model of stress (Lazarus & Folkman, 1984) suggests that individuals perceive stressors differently and also show distinct behavior in response to these experiences based on their resources and coping abilities.

However, despite these developments, a lack of research connecting personality characteristics with the demands of the teaching workplace still represents a significant gap in research on teacher professionalism. In order to fill this gap, the present study aims at integrating this interactional approach into the field of teacher professionalism and teacher stress research by introducing the temperamental trait sensory-processing sensitivity (SPS) as first suggested by E. N. Aron and Aron in 1997. It is highly suitable for introduction into the field of teacher professionalism as it represents the interface of personality and environmental aspects due to interindividual differences with regard to depth of processing of surrounding information and stimuli.

Based on existing personality and temperament theories, including, for example, the theory of behavior inhibition by Gray (1981) and Kagan (1994), or the approach on stimulus screening by Mehrabian (1991), SPS has been defined as a temperament trait that is genetically determined and measurable using the Highly Sensitive Person (HSP)- Scale (E. N. Aron & Aron, 1997). It has been found to be distinguishable from other personality traits, such as shyness, social introversion, or emotionality (e.g., Ahadi & Basharpoor, 2010; E. N. Aron & Aron, 1997; E. N. Aron, Aron, & Davies, 2005; Sobocko & Zelenski, 2015), measured as part of the Big Five personality traits (McCrae, 2009), and characterized by four main features: depth of processing, inhibition of behavior, elevated emotional affectivity, and sensitivity to (subtle) stimuli (e.g., E. N. Aron, Aron, & Jagiellowicz, 2012). Existing empirical findings suggest an association between SPS nd negative affect (for an overview, see Greven et al., 2018; Wyller, Wyller, Crane, & Gjelsvik, 2017). Two main reasons behind this are, firstly, the fact that a level of overstimulation is reached more quickly in people with higher levels of SPS than

in people with lower levels; and secondly, adverse childhood experiences, which are also assumed to play an important role for the effects of this trait (e.g., E. N. Aron et al., 2012). It is assumed to be normally distributed in the general population with a minority (i.e., 30%) of the population reaching notably high or particularly low scores on the HSP-scale (Lionetti et al., 2018; Pluess et al., 2018).

Due to the similarity between different approaches across research fields, such as developmental psychology, an overarching meta-theory has been introduced into the research field recently. In particular, in addition to SPS (E. N. Aron & Aron, 1997), the theory of environmental sensitivity (Pluess, 2015) connects the following theories: biological sensitivity to context (Boyce & Ellis, 2005), differential susceptibility (Pluess & Belsky, 2010), and vantage sensitivity (Pluess & Belsky, 2013). As can be inferred from the name, all of the aforementioned theories have individual differences regarding people's reactivity to environmental aspects in common. Furthermore, it strengthens the positive effects of positive and supportive experiences, which is particularly supported by the theory of vantage sensitivity.

This development offers the opportunity to also focus on the positive asset of the trait in the teaching work place, but also systematically within the clinical context (Pluess, 2017; Villiers, Lionetti, & Pluess, 2018). Both aspects represent a significant research gap in research on SPS (Greven et al., 2018).

Based on the aforementioned state of research and related research gaps, the present study aims at answering the following two general research questions and, consequently, addressing two important research gaps in the field of teacher professionalism and SPS research (see also Greven et al., 2018).

- Can the construct's validity be supported in the present study by successfully differentiating SPS from variables of psychological well-being (i.e., Depression, Anxiety, and Stress)?
- Do highly sensitive teachers perceive the characteristics of their professional lives differently than non-highly sensitive teachers and how does SPS relate to perceived stress?
- How does SPS relate to different symptoms of mental disorders and can results reveal empirical evidence for the presence of vantage sensitivity in the clinical context?

- How do highly sensitive teachers differ among each other, how do the two samples differ with regard to SPS and related variables, and can an overarching model of teacher stress including SPS be supported?

These four general goals represent the overarching two-fold aim of the present study, which combines three lines of research: On the one hand, it aims at introducing SPS as an additional temperamental trait into the research field of teacher professionalism and teacher stress, while, on the other hand, it aims at gaining further insight into the role of SPS in the clinical context, closing existing research gaps in SPS research.

Figure 1 below depicts the main research questions graphically, combining the aforementioned lines of research.

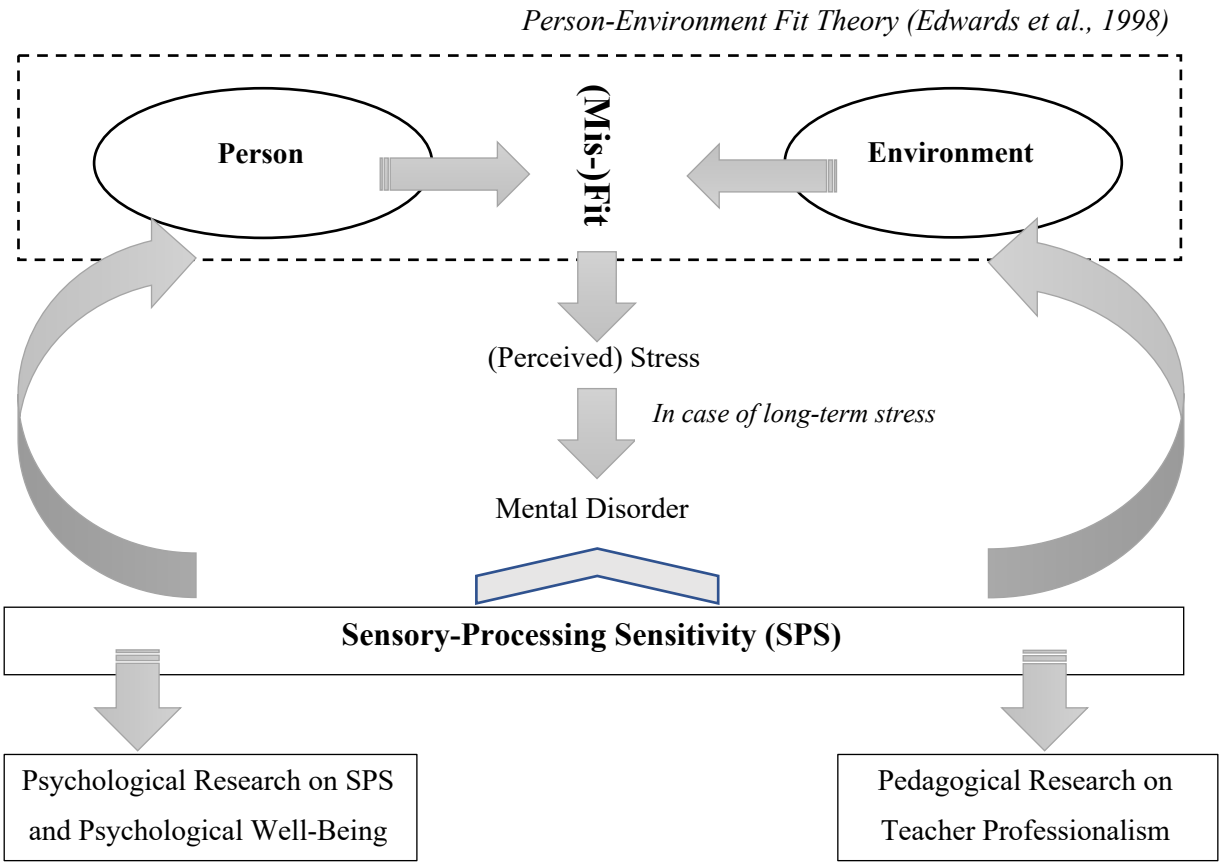

Figure 1. Own graphical depiction of the study's theoretical sections.

In order to be able to answer these research interests, the present study follows the subsequently illustrated structure, further providing content for the areas included in the Figure above.

Chapter 2 represents the beginning of the theoretical background, containing a description of the Person-Environment Fit theory from a personality psychology perspective, which further includes definitions of basic traits, relevant empirical findings, and important underlying (theoretical) models for all three entities separately: the person (i.e., including definitions of basic terms in the field of personality psychology and the five factor model of personality; see chapter 2.1.), the situation (or environment; i.e., including a definition of teaching, and the description of relevant characteristics of the teaching profession based on conceptualizations by Rothland; see chapter 2.2.), and the interaction of both (i.e., including important theories and models, such as the structural-theoretical perspective, standards, normative and empirical theories as well as models describing skills and competences relevant for addressing the demands of teaching, and the role of different personality-related factors for teaching; see chapter 2.3.). All of the descriptions first start out with a general introduction and subsequently lead to a focused summary on relevant aspects with regard to the teaching profession.

The **3rd chapter** introduces the main construct of the present study, SPS, including a more detailed portrayal of the definition (chapter 3.1.), theoretical background (chapter 3.2.), its measurement (chapter 3.3.) and identification of people with the trait (chapter 3.4.), its relationship with other personality traits and characteristics (i.e., in support of its validity; chapter 3.5.), the important role of the environment (chapter 3.6.), and empirical findings in line with negative affect and psychological ill-health (chapter 3.7.) as well as the increasing focus on positive effects. Subsequently, findings of SPS in the work context, also with regard to teaching, are summarized (chapter 3.8.). The chapter closes with the characterization of SPS within the overarching trait of environmental sensitivity (chapter 3.9.), an explanation of the other theories integrated in this framework and a summary of criticism of the trait (chapter 3.10.).

Chapter 4 focuses on the perception of stress as a misfit between a person and the environment. Based on the general approach of the Person-Environment Fit theory (chapter 4.1.), basic terms as well as consequences related to psychological ill-health and psychopathology are defined (chapter 4.2.), including an excursus to the field of Positive Psychology (chapter 4.2.6.). Subsequently, three models representing the underlying framework of the present study are introduced (chapter 4.3.). The role of personality-related characteristics in line with stress and coping (chapter 4.4.) and empirical findings with regard to teacher stress (chapter 4.5.) are

summarized, before finally, in chapter 5, the two main goals of the present study and related research gaps are summarized: SPS and the teaching work place (chapter 5.1.) and its role in the clinical context (chapter 5.2.).

Building on the research gaps identified in the fifth chapter, **chapter 6** further states the research questions and hypotheses, which are twofold: preliminary analyses (chapter 6.1.) and the main analyses and results (chapter 6.2.).

Subsequently, the **seventh chapter** describes the methodological approach, including the project context (chapter 7.1.), the study design (chapter 7.2.), decisions regarding missing values (chapter 7.3.), socio- and school-related demographic data (chapter 7.4.), measuring instruments included in the present study (chapter 7.5.), applied statistical analyses (chapter 7.6.), some considerations about dealing with assumptions (chapter 7.7.) as well as considerations regarding confounding variables (chapter 7.8.).

In **chapter 8**, all the research questions stated beforehand, are answered, following the same structure of research questions and hypotheses as described before (chapters 8.1. and 8.2.).

Chapter 9 concludes this dissertation by summarizing the results of the present study (chapter 9.1.) and drawing practical and scientific implications (chapter 9.2.). Finally, the study is reflected critically (chapter 9.3.), which leads to the conclusion (chapter 9.4.).

2. Theoretical Background: The Person-Environment Fit Theory from a Personality Psychology Perspective

The main goal of researchers investigating human personality, which is the main focus of the present study, is to specify and define observable differences as well as to identify static biological variables underlying and determining behavior (Eysenck & Eysenck, 1985; Pickering and Corr, 2008. Eysenck (1981), for example, describes personality as an important part of every field of applied psychology due to people's individual differences and their consequent variations in behavior given identical situations. Although early concepts of human personality characteristics were explored as early as 2000 years ago (for a summary of the development see Ashton, 2018), more systematic studies of human personality arose in the 19th century, with the beginning of modern personality psychology. Asendorpf (2007), as one example, describes the modern field of personality psychology as an empirical science investigating individual characteristics that are lasting, non-pathological and behaviorally relevant in nature. It focuses on ordinary variations of psychology while taking genetic and neuronal differences into account as well (Asendorpf, 2007).

However, people, including their specific characteristics, act in an environment that is also characterized by different qualities and components. These circumstances have led scientists in recent decades to discuss whether these two entities interact at all and, if so, which one has a stronger effect on the respective other one (for an overview see Funder, 2001, 2009; Schütz, Rüdiger, & Rentzsch, 2016; Wagerman & Funder, 2009). In particular with regard to psychological well-being, this question has gained interest given that various theories suggest that people interpret situations differently with regard to the challenge they pose on the person (e.g., Lazarus, 2006). In the psychological research field, this discussion is known as the person-situation debate and has generated various perspectives. Three popular ways of viewing this relationship are the dispositionalism (i.e., only personality characteristics influence behavior), the situationism (i.e., only situations have an effect on behavior) and the interactionalistic approach (i.e., interrelation between personality characteristics and situations) (Wagerman & Funder, 2009). Although "there is considerable agreement that personality attributes exist and that these attributes shape how individuals adapt to the challenges of life" (Lucas & Donellan, 2009, p. 146), some questions are still open. This is, for example, indicated by the fact that in 2009 the Journal of Research in Personality published one whole issue on the person-situation debate with numerous articles addressing remaining problems in the field. In a very recent

publication by Furr and Funder (in press), this agreement has been further strengthened. They state that “a surprising number of researchers appear to be personally as well as professionally invested in believing that either situations or persons have stronger effects on behavior” (Furr & Funder, in press, p. 1). Moreover, they claim that “personality psychology is moving beyond such disagreements and debate, toward a more complete understanding of why people do what they do” (p. 1), which improtantly includes the relationship between people and the environmental conditions within which they act. In the present study, I follow this recent development in the field and aim at analyzing behavior and psychological well-being in certain environments from a personality psychological point of view. The particular focus of the present study is on the teaching profession due to two reasons: On the one hand, teaching is viewed as a very complex and demanding profession due to its specific workplace characteristics (Husén & Postlethwaite, 1994); on the other hand, as discussed above, research on teacher stress is still lacking the integration of personality-related and environmental aspects for the explanation of the onset of stress. In order to set the theoretical foundation in this regard, the following two chapters describe the two entities (i.e., the environmental workplace conditions of teachers and personality-related variables that have been investigated in this line so far) in more detail. After an introduction in the field of personality psychology including important definitions and theories, the second part of this chapter aims at describing the situational aspect, first in general, and subsequently the specific environment in the present study, which is the teaching profession. In all the subsequent chapters, the focus is always on the persons and their behavior within certain situations.

2.1. The Personality-Related Aspects

In this first part of the upcoming chapter, the research field of personality psychology is introduced. After definitions of basic terms and expressions in the field as well as the differentiation to other person-related characteristics (chapter 2.1.1.), one example theory is described (chapter 2.1.2.). It represents the part of the model that is colored with orange in Figure 2 below.

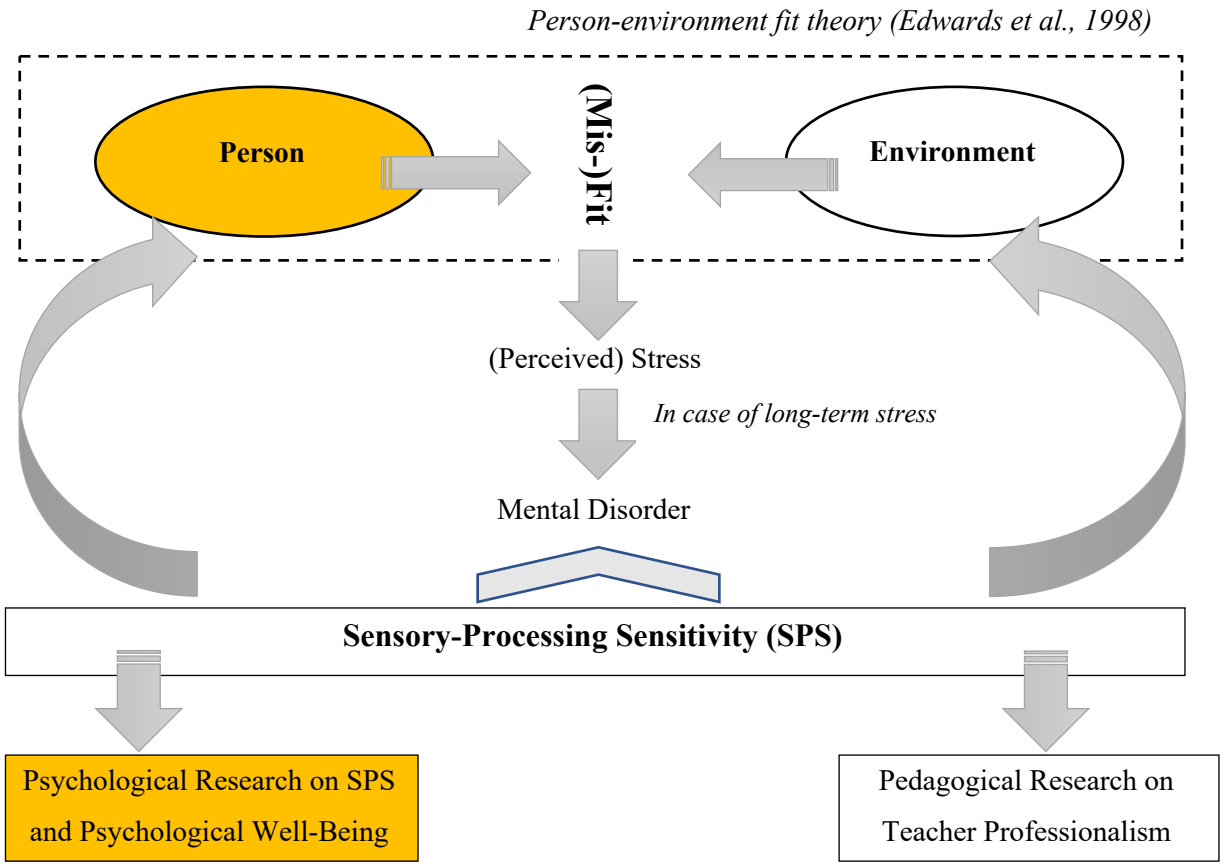

Figure 2. Own graphical depiction of the study's theoretical sections. Coloured parts represent the focus of the upcoming section.

2.1.1 Definition of basic terms in the field of personality psychology.

One important question in order to understand the field of personality psychology is the exact definition of the term personality and, in particular, what it is that researchers aim at measuring when analyzing an individual's personality. In general, it can be said that scientists aim at measuring

> ways in which any given person can be similar to some people yet different from other people. That is, some researchers investigate the important characteristics (or traits) along which people vary, with the aim of measuring those characteristics, and of learning about their causes and their consequences. (Ashton, 2013, p. xxi)

Scientists do that by either investigating a single person intensively (which would be called the idiographic approach), or by analyzing characteristics of many people in order to reveal several "general laws of personality" (Ashton, 2013, p. xxiii) and to find out how these characteristics relate to each other (which would follow the nomoethic approach). What researchers measure

by applying various methods, including self-reports, observer reports, or direct observations across years (most commonly applied), can be grouped into traits, states, and temperament.

2.1.1.1 Definition of trait.

As an underlying comprehensive definition, a description by Ashton (2013) is used as a theoretical basis for the present research paper:

> briefly, a personality trait refers to differences among individuals (1) in a typical tendency to behave, think, or feel (2) in some conceptually related ways (3), across a variety of relevant situations (4) and across some fairly long period of time (5). (Ashton, 2013, p. 27)

The definition of personality characteristics as traits can be interpreted as rather consistent and widely accepted. This can be seen by the similarities of definitions by various personality researchers, such as (Allport, 1969, p. 48), McCrae and Costa (1990, p. 23), or Mehrabian (1991, p. 77), and encyclopedias of psychology (e.g., Weiner & Craighead, 2010a, p. 1222).

2.1.1.2 Definition of state.

In comparison to the definition of traits stated above, states can be defined as characteristics that are more general, last for shorter durations, and are therefore not seen as stable. Furthermore, they are often "conscious, verbally reportable qualities" (Matthews, Deary, & Whiteman, 2009, p. 85). One example would be a "temporary feeling of anxiety" (p. 85).

2.1.1.3 Definition of temperament.

The differentiation between trait and temperament is not clear and has not fully been agreed upon yet. While some researchers use both terms interchangeably, others interpret a differentiation as crucial. Buss and Plomin (1984), for example, state that "temperament involves *early-developing personality traits*"[3] (p. 5). A description by Kagan (1994), for example, states that temperamental characteristics include "physiological and psychological processes that emerge early in development" (p. 35), further supports the assumption of temperamental characteristics being already existent in early childhood. An additional important aspect of temperament is the involvement of physiological processes (e.g., Kagan,

[3] All emphases found in direct quotations are adopted from the original.

1994; Rothbart, 2011) or the facets of arousal, emotionality and sociability (e.g., Buss & Plomin, 1984).

However, this list of temperament characteristics is not exclusive and has been criticized repeatedly (e.g., Asendorpf, 2007). Two examples of critical aspects are the following: Intelligence is not seen as part of a person's personality, but represents characteristics that would define a temperament trait, such as effects on behavior and the genetic determination (for an overview, see Carver & Scheier, 2008, pp. 3-12). Secondly, it has not been empirically shown yet that temperament traits have a stronger genetic determination than attitudes or motivation (for an overview, see Asendorpf, 2007, p. 179).

Taken together, personality characteristics, or traits, of people that are defined as being temperamental in nature are still being discussed and not entirely agreed upon yet. They show very similar characteristics to those of personality traits and by definition only differentiate with regard to their stability, the stronger genetic disposition, and the closeness to physiological processes.

2.1.1.4. Other personal characteristics.

Finally, people can also differ in characteristics that do not fall into the range of personality or temperament traits, as defined above. Examples might be "the strength of people's convictions in their own effectiveness", in the scientific literature defined as self-efficacy (Bandura, 1977, p. 193) or the way people perceive certain (stressful) situations and how the cope with them (e.g., Lazarus & Folkman, 1984). Similarly, people also show different (dysfunctional) personal beliefs that have been developed and automatized throughout their lives (e.g., Brown & Beck, 2002). These three theories are just examples of a large number of additional personal characteristics that can be found in the literature.

2.1.2. The five factor model of personality: An example theory of personality and temperament

Despite the high number of theories within the field of personality psychology, the model including five personality traits (also called the Big Five personality traits) suggested by McCrae and Costa (1990, 2008) gained acceptance in the scientific field of personality and "is currently the dominant paradigm in personality research, and one of the most influential models in all of psychology" (McCrae, 2009, p. 148). This is mainly due to the model's relatively long

historical development, its robustness, and the number of times these five facets are referred to repeatedly in the scientific literature, providing it with acceptance across the international (e.g., Goldberg, 1990; John & Srivastava, 1999) and also the German scientific field (e.g., Körner, Geyer, & Bräler, 2002; Lang, Lüdtke, & Asendorpf, 2001).

Based on various studies and empirical findings that have been revealed throughout the decades, McCrae and Costa developed various questionnaires that would allow these traits to be measured (for an overview see McCrae & Costa, 1990). However, despite the same number of personality factors, the names of the traits differed significantly, which has been criticized repeatedly and is still object to frequent and intense scientific discussions (e.g., Funder, 2001; McCrae & John, 1993). Contrary to Tupes and Christal (1992), who named their traits Surgency, Agreeableness, Dependability, Emotional stability and Culture, McCrae and Costa (1990, 2008) chose different labels for their popular model, which are depicted in Table 1 below. In particular, those are summarized using the acronym OCEAN, including Openness to experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. The table also contains particular terms and synonyms that are commonly used in order to explain those characteristics, enabling a more detailed insight into the development of those traits.

Table 1

Overview of the Big Five Personality Traits by McCrae and Costa

Personality factor	Description	Low scorer	High scorer
O	down-to-earth – imaginative uncreative – creative conventional – original prefer routine – prefer variety uncurious – curious	-favors conservative values -judges in conventional terms -uncomfortable with complexities -moralistic	-values intellectual matters -rebellious, nonconforming -unusual thought process -introspective
C	negligent –conscientious disorganized – well-organized late – punctual aimless – ambitious quitting – preserving	-eroticizes situations -unable to delay gratification -self-indulgent -engages in fantasy, daydreams	-behaves ethically -dependable, responsible -productive -has high aspiration level

(continued)

Personality factor	Description	Low scorer	High scorer
E	reserved – affectionate loner – joiner quiet – talkative passive – active unfeeling – passionate	-emotionally bland -avoids close relationships -over-control of impulses -submissive	-talkative -gregarious -socially poised -behaves assertively
A	suspicious – trusting stingy – generous antagonistic – acquiescent critical – lenient irritable – good-natured	-critical, skeptical -shows condescending behavior -tries to push limits -expresses hostility directly	-sympathetic, considerate -warm, compassionate -arouses liking -behaves in a giving way
N	calm – worrying self-satisfied – self-pitying comfortable – self-conscious unemotional –emotional hardy – vulnerable	-calm, relaxed -satisfied with self -clear-cut personality -prides self on objectivity	-thin-skinned -basically anxious -irritable -guilt-prone

Note. Descriptions are taken from McCrae and Costa (1990, pp. 3, 47). O = Openness; C = Conscientiousness; E = Extraversion; A = Agreeableness; N = Neuroticism.

However, despite its popularity and wide acceptance in the field, it consequently prevented other concepts of personality. Furthermore, the statement that those five traits are the ultimate characteristics that can describe the full range of human characteristics, is still rejected (for a summary, see Mayr, 2014). In support of that, Funder (2001) states that, "whereas almost any personality construct can be mapped into the big five, you cannot derive every personality construct from the big five" (p. 200).

2.2. The Situation-Related Aspects

As already described above, a situation also plays an important role for the ways people behave, which represents the environment in the present study's theoretical background (see colored part in Figure 3 below). In particular "people are particularly likely to enact a given behavior in particular situations, and there's something *about those particular situations* that triggers or elicits that behavior" (Furr & Funder, in press, p. 5). One example would be a situation in the office with a superior present, which would probably lead to a particular focus and concentration toward a specific task, while a visit in a bar, including some music and drinks, might elicit dancing, talking and laughing.

Investigating the influence of situational cues and aspects on a person's (social) behavior, cognition and emotions, is one important focus of social psychology (e.g., Furr & Funder, in press). Various influential and important research studies in the history of psychology have been conducted that reveal the role of the situation, also referred to as aspects of the environment in the present study (for an overview, see Ross & Nisbett, 2011). One example is the discovery of the so-called bystander effect (Darley & Latané, 1968), showing that the number of people and their behavior influences one's own behavior in a situation. Another very popular experiment was that by Milgram (1963), revealing evidence for the influence of a person's authority on a participant's behavior.

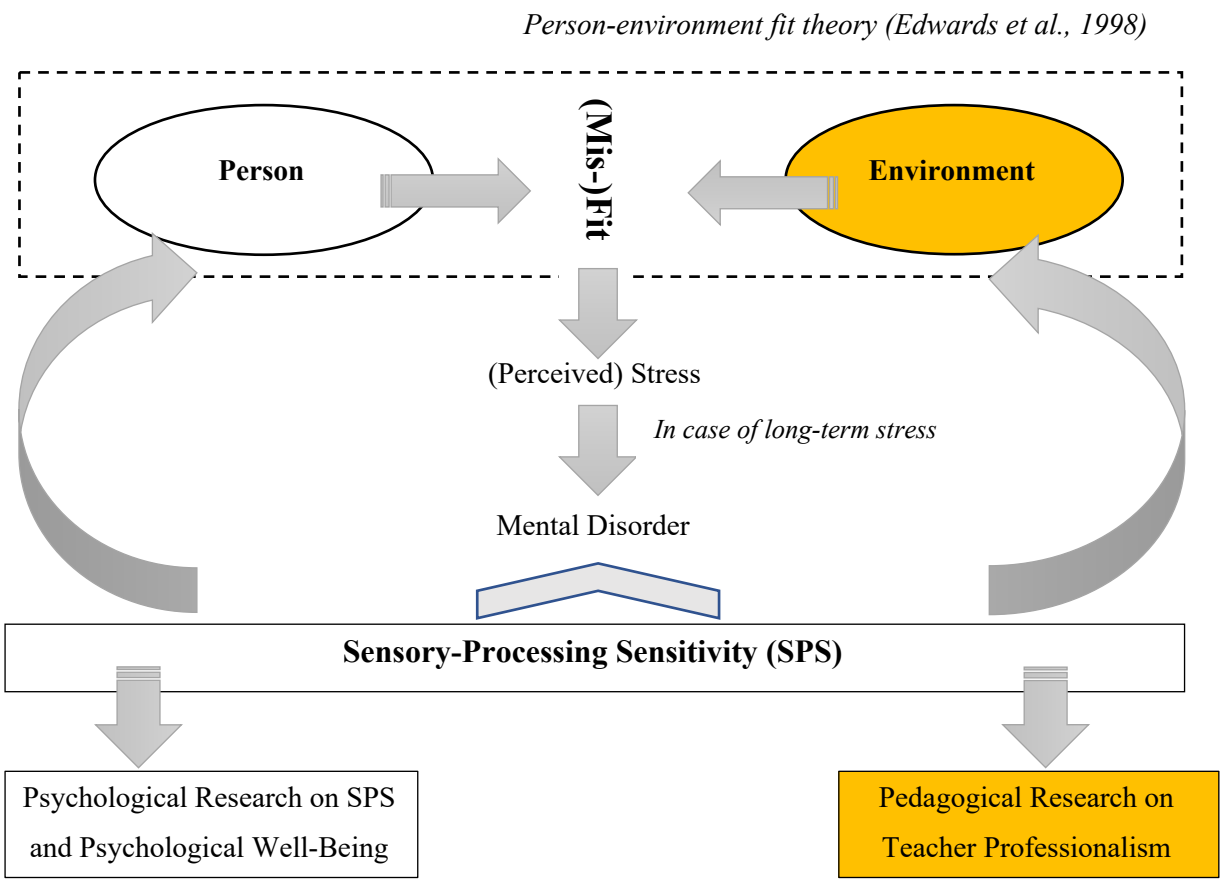

Figure 3. Own graphical depiction of the study's theoretical sections. Coloured parts represent the focus of the upcoming section.

2.2.1. Situtional aspects in the present study: The teaching profession.

In the present study, the situation referred to is the professional environment as a teacher, including specific situations and conditions in the school work place. Based on this framework, the upcoming paragraphs at first build the foundation by defining the term teaching and

introduce some developments with regard to the definition of teaching as a profession (section 2.2.1.1). In the second part of this chapter, specific situational characteristics of the teaching profession are described, including respective characteristics, expectations and demands as well as the general tendency of uncertainty as an underlying aspect of the structural-theoretical approach toward the teaching profession (chapter 2.2.1.2.).

2.2.1.1 Definition of teaching and the classification of teaching as a profession.

Despite extensive literature on the subject, the term teahing is not consistently defined across fields. One reason for this might be that "the core of teachers' daily work is a practice so familiar it is easily taken for granted" (Husén & Postlethwaite, 1994, p. 6136). While the main task of teachers have been described as "getting pupils to learn" (p. 6136), such a definition does not give detailed information about the specific steps that teachers have to take or fulfill in order to help students learn successfully. Rather, teaching consists of numerous different activities and tasks, in and outside of the classroom. In order to get an overview, one can look at the Teaching and Learning Survey (TALIS), a large-scale international survey administered and published by the Organisation for Economic Co-operation and Development (OECD, 2014). Some answers of teachers when they were asked what they do during their everyday life included "lesson planning, marking students' work, or meeting with students and parents" (p. 8), school management or extracurricular activities, to just name a few examples. However, the time they spent with these tasks varied significantly between different countries.

The same diversity and complexity can be found in the scientific literature and is also the reason why teaching is often defined as "a labor process without a clearly defined object (in the sense of the physical product produced in factory work)" (Husén & Postlethwaite, 1994, p. 6136), rather than a few specific tasks. For example, teachers have to apply different teaching methods, assess students' learning and development as well as give them tasks and check whether they fulfilled them, to only name a few.

Again, this might seem relatively clear and detailed, but looking at the vast amount of literature on each of the very few aspects mentioned above, it becomes clear that it is a highly complex subject matter. In order to exemplify that: If the term *teaching method* is searched for in the educational online system Educational Resources Information Center (ERIC on March 12, 2019), over 116,000 search results were found. Similar numbers can be found when searching

for “assessment for learning”. Given that these are just two relatively small research fields in the whole area of teaching, one can imagine about the dimensions the field has as a whole. Furthermore, not just the field of education focuses on research on teaching, also related fields conduct studies and develop theories for teaching and teachers. Those are, for example, the research field of psychology, the specific subject matters and the related didactic sections, and parts of the field of sociology, as all of teaching takes place in a social context (e.g., Banks, 2012, p. 2140), including dealing with classroom disruptions, or behavioral problems in the classroom, as well as administrative aspects that are also important to consider when working with students (OECD, 2014, p. 9). As can be seen, the field is too complex to come up with a short definition or a summary of what it is understood under the term teaching.

However, throughout the upcoming theoretical chapters, different characteristics and facets of teaching are described in more detail that may support an understanding of this complex process. At this point, one approach representing an approximation to some characteristics, is already introduced: The ongoing discussion of the question whether teaching can be seen as a profession or an occupation, and consequently, whether teachers are professionals or workers. It represents one important line of research within the field of teaching. Numerous researchers have already tried to answer this ambiguity for the last few decades, and the following paragraph offers a short summary of this ongoing discussion based on the international research perspective.

As can be seen in the wording of this question, both terms are applied in different contexts. In particular, the term *profession* is used to define jobs with specific characteristics and to differentiate them from other jobs that are defined as *occupations* (e.g., Cramer, 2012, 2016; Esslinger-Hinz & Sliwka, 2011; Hoyle, 1995, 2008; Villegas-Reimers, 2003). In the occupational sociology literature, diverse definitions of *profession* are found. Those concepts vary significantly between different scholars due to their varying theoretical frameworks. In order to make the differentiation clearer, some example characteristics are mentioned at this point (for an overview of further characteristics of a profession, see Guerriero, 2017, p. 22):

- social function, knowledge, practitioner autonomy, collective autonomy, professional values (Hoyle, 1995; with regard to the aspect of autonomy, see also Helsper, 2016);
- responsibility for solving crises (Oevermann, 1996; 2016, p. 112), “which are related to health, psychological integrity, justice, education, etc.” (Helsper, 2016, p. 107);

- autonomy, the ability to make decisions and the capacity to act (Helsper, 2016);
- "obligation of service to others, as in a 'calling'; understanding of a scholarly or theoretical kind; a domain of skilled performance or practice; the exercise of judgment under conditions of unavoidable uncertainty; the need for learning from experience as theory and practice interact; and a professional community to monitor quality and aggregate knowledge" (Shulman, 1998, p. 516);
- "(a) all individuals permitted to practice in certain capacities are adequately prepared to do so responsibly; (b) where certainty about practice does not exist, practitioners, individually and collectively, continually seek to discover the most responsible course of action; and (c), as the first two points suggest, practitioners pledge their first and primary responsibility to the welfare of the client" (Darling-Hammond, 1990, p. 268);
- "… focus on relevant and existential societal concerns, such as health and cure, law and justice, salvation and last questions" (Cramer, 2012, p. 26); and
- not aiming at profit, but rather at societal well-being (Terhart, 2010).

While some researchers have agreed upon the fact that teaching meets these requirements for being seen as a profession (for an overview, see for example Husén & Postlethwaite, 1994, pp. 6093-6095), this approach was also taken by political institutions, such as the OECD (for an overview, see for example Guerriero, 2017). In their descriptions of tasks and characteristics of teachers in their publications, they support this assumption by using headlines that include the term teaching profession. In particular, in line with the OECD's Innovative Teaching for Effective Learning (ITEL) project, the following definition can be found:

> We view teaching as a knowledge-rich profession with teachers as 'learning specialists.' As professionals in their field, teachers can be expected to process and evaluate new knowledge relevant for their core professional practice and to regularly update their knowledge base to improve their practice and to meet new teaching demands. (OECD, 2014, p. 1)

The "pedagogical core of the teaching profession" is defined in this document as "the pedagogical knowledge base of teachers" (p. 1).

However, while these characteristics are seen as fulfilled in jobs like medicine and law, transferring them to teaching in order to decide on its professional nature has led to various

challenges and disagreement in the domestic and international literature. The main indication for this is the fact that it has been a highly and diversely discussed topic until today (e.g., Guerriero, 2017; Howsam, Corrigan, Denemark, & Nash, 1985). Villegas-Reimers (2003), for example, summarized the state of research and theory in the following way: "Even when most of the literature nowadays is focusing on the perception of teachers as professionals, there is still some disagreement" (p. 36) and some contradicting propositions. It even has been suggested that the discussion is not just about the use of language and specific terms, but rather "ultimately relate to the quality of education" (Husén & Postlethwaite, 1994, p. 6092).
Predicated on different scientists' criticism that the teaching profession fulfills some, but not all requirements of a profession, a second perspective appeared, which defined teachers as semi-professionals. A few examples supporting this view points, are the following.

One example ground for criticism is based on the aforementioned therapeutic relationship between teachers and students (e.g., Oevermann, 2002). In particular, it has been brought up that teachers themselves also initiate crises in the students by questioning and therefore enriching students' knowledge. Furthermore, Helsper (2014) points out two sides of the working environment with regard to teachers' autonomy, which represents an important aspect of professionalism: Pedagogical freedom on the one hand and dictated regulation on the other hand (Helsper, 1996; see also Helsper, 2004), leading to teachers not being entirely autonomous (Shulman, 2005). Similarly, collective autonomy is often also not fulfilled due to the fact that teachers are employed by the state (e.g., Villegas-Reimers, 2003). Additionally, it has been suggested that professional values are difficult to define due to the high diversity in the students, teachers have to teach. Similarly, ethical codes have only been defined in a few countries (e.g., Villegas-Reimers, 2003). As one final example, although Hoyle (1995) states that teachers' social function has been accepted as important, he criticizes the aspect with regard to teachers' knowledge base, which is seen as crucial and only acquirable through special trainings for professions, and which based on his definition is not fulfilled in teaching.

These critical aspects lead to the consideration of teaching not as a distinct profession, but rather one that has to be developed further (e.g., Helsper, 2014), which represents a *semi-profession* per definition (Etzioni, 1969; for an overview, see also Guerriero, 2017, p. 23), alongside social work and nursing. When considering characteristics of a semi-profession that also have been suggested by various scientists, it can be seen that they also fit characteristics of teaching. Some

of the characteristics (summarized by Howsam et al., 1985, pp. 13-14) that make teaching a semi-profession are, for example:

- "teaching is lower in occupational status than other professions such as medicine or law",
- "the length of the training period is the lowest of all the professions", and
- "teachers identify more closely with and accept the authority of the employing school or school system than the organized teaching profession".

Taking all aspects described above into account, it can be summarized that although teaching does meet some of the criteria of a profession as defined above, there are still some aspects that cannot be met. Therefore, the present study follows the conceptualization of teachers as *semi-professionals* and consequently a statement by Howsam and colleagues (1985, p.13): "It is clear that teaching presently falls short of meeting the recognized criteria for a mature profession. Comparison with the criteria for subprofessions shows a much closer correspondence." Further information can be gained when looking at the different approaches toward teaching as a profession in the literature (i.e., with a main focus on the German literature).

In line with research on teacher professionalism, different main theories can be found, which are discussed controversly (e.g., Helsper, 2007; K. J. Tillmann, 2014). Three theories represent the focus of the present study. The structural-theoretical perspective (e.g., Helsper, 2014; see chapter 2.3.1.), the competence approach (e.g., Baumert & Kunter, 2011; see chapter 2.3.2.2.), and the personality approach (see Mayr, 2014; 2016; see chapter 2.3.3.).

However, in order to be able to offer a clear, simple and concise use of language in the present study, and to give consideration to the use of the term teaching profession in the population, the media, politics, and teachers themselves (e.g., Husén & Postlethwaite, 1994), the expression teaching profession is still be used in the upcoming sections. However, it is important to note that this term's meaning in the present context takes into account all the aforementioned limitations with regard to this conceptualization the fact that it rather has to be seen as a semi-profession.

2.2.1.2 The work place of teachers: Important characteristics based on conceptualizations by Rothland.

When attempting to offer an extensive and strategic description of the characteristics of the

teaching profession and the work place, it is important to consider related difficulties. Those arise mainly because many different disciplines, such as educational psychology, developmental and clinical psychology, or public health, aim at approaching this particular workplace from partially different points of view (e.g., Nieskens, 2016).

However, at this point and for the pupose of this study, an objective and descriptive overview of basic tasks and characteristics of the work environment (e.g., Cramer, 2012, 2016; Villegas-Reimers, 2003, pp. 39-42), is essential. Due to the lack of a concise, appropriate, and comprehensive summary of characteristics in the English literature, and the importance of these specific characteristics in the empirical study of the present study, this section will focus on aspects as they have been defined by Rothland (2013) and other researchers based on existing, mainly theoretical literature. It represents one of the most popular and accepted summaries of the profession in the German field of teacher research, which the present research study is embedded in. However, these descriptions are still enhanced by international literature where it was applicable. The following table (Table 2) offers an overview of the characteristics found in the literature, which particularly pose a challenge to teachers.

Table 2

Common Work Place Characteristics of the Teaching Profession

No.	Work place characteristic
1	Division of the work place
2	Not completely regulated working hours
3	Openness as a matter of principle and illimitableness of tasks
4	Vacillation between regimentation and pedagogical freedom
5	Forced collaboration between teachers and students and their asymmetrical relationship
6	Limited control about teachers' work and the achieved effects
7	Teachers' behavior under the condition of twofold contingency
8	Lack of feedback about long-term effects of teaching and the lessons
9	Occupation without career opportunities
10	Lack of a professional secret and the public ability to judge the teaching profession
11	External and physical conditions
12	Role of cooperation in the teaching profession
13	Expectations from different actors

Note. Characteristics adapted from Rothland (2013).

1) Division of the work place

Teachers' structural work places are usually divided into two parts. Those include one work place in the school, such as the classroom, teachers' lounge, or other facilities of the school, and on the other hand the work place at home on the private desk, which is often used as time for preparations, evaluations, or post-processing of lessons and exams. While the first

workplace in the school is relatively structured based on a fixed time schedules and organizational aspects, the second part is not structured, which leads to teachers having to decide themselves what to do at what time and can lead to problems in balancing work and free time as well as problems in perception of the job by the public (Rothland, 2013, pp. 23-24).

2) Not completely regulated working hours

As already described above, the working hours in the school are structured due to their schedules. In addition to and outside of these hours, however, teachers have to prepare lessons, grade exams, collaborate with parents or other institutions, participate in their own training, and many more tasks. It is then the teachers' responsibility to decide when they are done because there is always more that can be done (Rothland, 2013, p. 24).

3) Openness as a matter of principle and illimitableness of tasks

Despite some broadly defined categories and standards by the Kultusministerkonferenz (Conference of the Länder Ministers of Education and Cultural Affairs; KMK, 2000, 2004, 2014) for the German context, details regarding concrete facets of teaching are more diverse and more loosely described when it comes to the American context, including those by the National Board for Professional Teaching Standards (NBPTS, 2015), or in the Australian context by the NSW Education Standards Authority (NESA, 2017). To offer a few examples, tasks include contact with parents and possibly other educational institutions, supporting individual students, applying effective teaching and learning strategies and many more (e.g., OECD, 2014). All these tasks, however, have in common that there is no defined end. A teacher can therefore read or attend trainings on teaching methods, prepare individualized learning tasks for single students or try to support individual students the whole day without finding a natural end (Rothland, 2013, pp. 24-25).

4) Vacillation between regimentation and pedagogical freedom

While on the one hand organizational aspects of the teaching profession are regulated by external entities such as the curricula, the length of single lessons, the beginning and end of a school year, holidays, the content that has to be covered, conditions due to a work contract etc., it is not described in detail how these tasks have to be fulfilled. This leads to significant flexibility as to how teachers fulfill these requirements, including the decision of which methodological and educational approaches they want to apply (Rothland, 2013, p. 25).

5) Forced collaboration between teachers and students and their asymmetrical relationship

The first aspect is based on two circumstances: On the one hand, neither the teachers nor the students can choose whom they want to work with for the years they attend school under the present conditions. Furthermore, students often do not attend school voluntarily (e.g., Helsper, 2004). In addition, asymmetry describes that imbalance between the two parties: Teachers know more and are the ones that have to teach students certain content. They are usually older and therefore have gained more experiences throughout their lives and careers, which leads to an increase in the age gap the longer they have been teaching (Rothland, 2013, pp. 25-26). Another difficulty in the teaching profession is the relationship between closeness and distance between teachers and students that teachers have to balance out in their everyday school life (e.g., Helsper, 2002).

6) Limited control about teachers' work and the achieved effects

If teachers' success is evaluated based on students' knowledge it has been found that not only teachers' work and effort, but also rather a large number of aspects play an important role in student learning. Some examples would be cognitive capacity, motivation and pre-existing knowledge, or one's family background (see also Helmke, 2012). It therefore has been agreed on by researchers that teachers only have a limited influence on students (Rothland, 2013, p. 26). This has also been described as the structural uncertainty of the teaching profession, which focuses on the underlying uncertainty of the teaching profession (e.g., Shulman, 1986, 1987; 2005; for more information, see chapter 2.3.1.).

7) Teachers' behavior under the condition of twofold contingency

This aspect is highly related to the previous one regarding teachers' limited control of students' achievement. Teaching is not a one-sided process, but rather students learn and develop when cooperating with the teacher. Consequently, knowledge is a result of co-construction and is not directly influenced by and reducible to the teacher. It therefore has been agreed on in the field that teachers can only offer learning opportunities (Rothland, 2013, pp. 26-27), which is in line with the utilization of learning model that will be described in more detail in a later chapter (2.3.2.2.; e.g., Helmke, 2012).

8) Lack of feedback about long-term effects of teaching and the lessons

Compared to failures, which usually can be detected relatively quickly, the long-term effects of teaching cannot be captured as easily, sometimes not at all for teachers. This is the case not only due to the aforementioned influence of other aspects, but also the fact that students' success later in life often does not happen within their physical school environment and also with a timely "delay" (Rothland, 2013, p. 27). This is also true with regard to feedback by the school management, other teachers or actors outside the school. Results of the TALIS (OECD, 2014) study further supported this assumption. In particular, it was found that while only around half the teachers receive feedback from the school management level and a little over 40% of teachers receive feedback from other teachers, less than one third of the teachers asked in the survey receive evaluations from outside the school.

9) Occupation without career-opportunities

This aspect summarizes various aspects specific for the teaching profession with regard to rewards for their work. In particular, it includes the two facts that on the one hand, a promotion is only possible for a few people in the school context, and on the other hand, the payment is based on years of experiences and education and generally more independent of a teacher's performance (Rothland, 2013, p. 27).

10) Lack of a professional secret and the public ability to judge the teaching profession

Due to the fact that all people in a society are confronted with the teaching profession, whether because they have been in school themselves or have children attending school, every citizen also thinks he or she knows exactly the tasks and environmental conditions of the profession. This is, however, seen too broadly and one-sided, and represents one of the many misleading facets of the job as a teacher that researchers and theorists have aimed at describing comprehensively for years. An additional difficulty is the missing of a professional secret (i.e., aspects that are only understood by those, who are trained in this area) and a special language, which usually is characteristic for a profession and further supports open judgment of the teaching profession, while at the same time hindering people from accepting the professional status of teachers (Rothland, 2013, p. 27; Nieskens, 2016).

11) External and physical conditions

The conditions under which teachers work vary greatly between teachers due to their particular schools and the facilities, locations, materials etc. This also includes noise not only within the

school buildings but also from the surroundings of the school from other sources, such as cars, trains, or other people (e.g., Nieskens, 2016). This can also be found in international research. Kyriacou (2001, p. 29), for example, describes lack of students' motivation, ambiguity, workload, change, time pressure, and working conditions as some of the factors that are especially stress-inducing in the teaching profession (for an overview of research, see Maslach & Leiter, 1999; or Rudow, 1999). This will be the focus of a later section as well (chapter 4.5.2.).

12) Role of collaboration in the teaching profession

When looking at school as a social organization (e.g., Fussangel, 2008; Fussangel & Gräsel, 2011, 2012) the collaborative aspect is important. In particular, it plays an important role in research on school development and effectiveness and represents one important aspect of good schools (e.g., Clement & Vandenberghe, 2000; Vangrieken, Dochy, Raes, & Kyndt, 2015). In particular, it has been stated that teachers act more as individuals and do not collaborate with other teachers in depth, although various empirical studies revealed that collaboration would be efficient with regard to student learning (Gräsel, Fussangel, & Pröbstel, 2006). Furthermore, it is assumed that it would lead teachers to reflect on their own work and consequently to an increase of quality and self-efficacy. Similarly, feedback was found to be related to job satisfaction, particularly with regard to participation in "collaborative professional learning activities" (OECD, 2014, p. 27). By drawing relationships to other researchers and various existing theories on cooperation of teachers, particularly the theory by J. W. Little (1990), Gräsel and colleagues (2006) further suggest three levels of collaboration with different underlying functions: exchange (occasional exchange, high level of autonomy, shared goals, low effort required), work-sharing cooperation (increase in efficiency as goal, agreement on goals) and co-construction (lower level of autonomy, developmental goal; see also Fussangel, 2008). Despite the fact that the third form of collaboration would be the most effective one, research shows that cooperation in schools is based on the other two, more superficial levels (e.g., Gräsel et al., 2006; Lortie, 1975, 2002; Richter & Pant, 2016; Vangrieken et al., 2015). A similar differentiation, but more toward the higher end of collaboration, was realized based on the results of the TALIS study (OECD, 2014). In relation with self-efficacy, teachers' collaboration was divided into four aspects: "Take part in collaborative professional learning", "engage in joint activities across different classes and age groups", "observe other teachers' classes and provide feedback", as well as "teach as a team in the same class" (p. 24). However,

research on collaboration between teachers is diverse and various approaches have been attempted based on different forms and contexts. Additionally, the usage of the term varies significantly. Consequently, various cooperative models and practices, such as team-teaching, lesson studies or professional learning communities have been suggested (Gräsel et al., 2006; for an overview, see Fussangel & Gräsel, 2011, 2012).

13) Expectations from different actors

Teachers are always confronted with expectations from different levels, such as parents, students, colleagues, superiors, and by the public, and also themselves, which further support teachers' perceived uncertainty (e.g., Husén & Postlethwaite, 1994). These expectations are related to roles people expect teachers to have and represent in their job. However, while some of the expected roles are shared by various actors due to common cultural and ethical considerations (e.g., Husén & Postlethwaite, 1994), other expectations and roles contradict each other, which leads to the impossibility to fulfill them all. Furthermore, it leads to the situation that teachers sometimes have to decide for one particular role. Rothland (2013, p. 31), for example, summarized a selection of different expectations, teacher roles and tasks. Based on his conceptualization, students, for example, would expect teachers to transfer knowledge, help and guide them, give orientation and even friendship. Along with these expectations go different roles, such as role model, counselor, expert, and fellow. The related tasks are consequently teaching, counseling, collaborating and educating. In comparison, the expectations by teachers' superiors are totally different. They, in contrast, expect participation in school development, individual development and training. This makes teachers not just administrators, but also supervisors, school developers and learners themselves. As can be seen with these examples already, the expectations and tasks are diverse and almost impossible to be fulfilled simultaneously; some researchers and theorists even state that it is impressive that teachers can fulfill the requirements despite these challenges (e.g., Rothland, 2013).

2.3. The Person-Situation-Interaction in the Teaching Profession

This upcoming chapter aims at describing theories on the interaction between the person and the environment from the teacher professionalism's point of view (see colored parts in Figure 4 below).

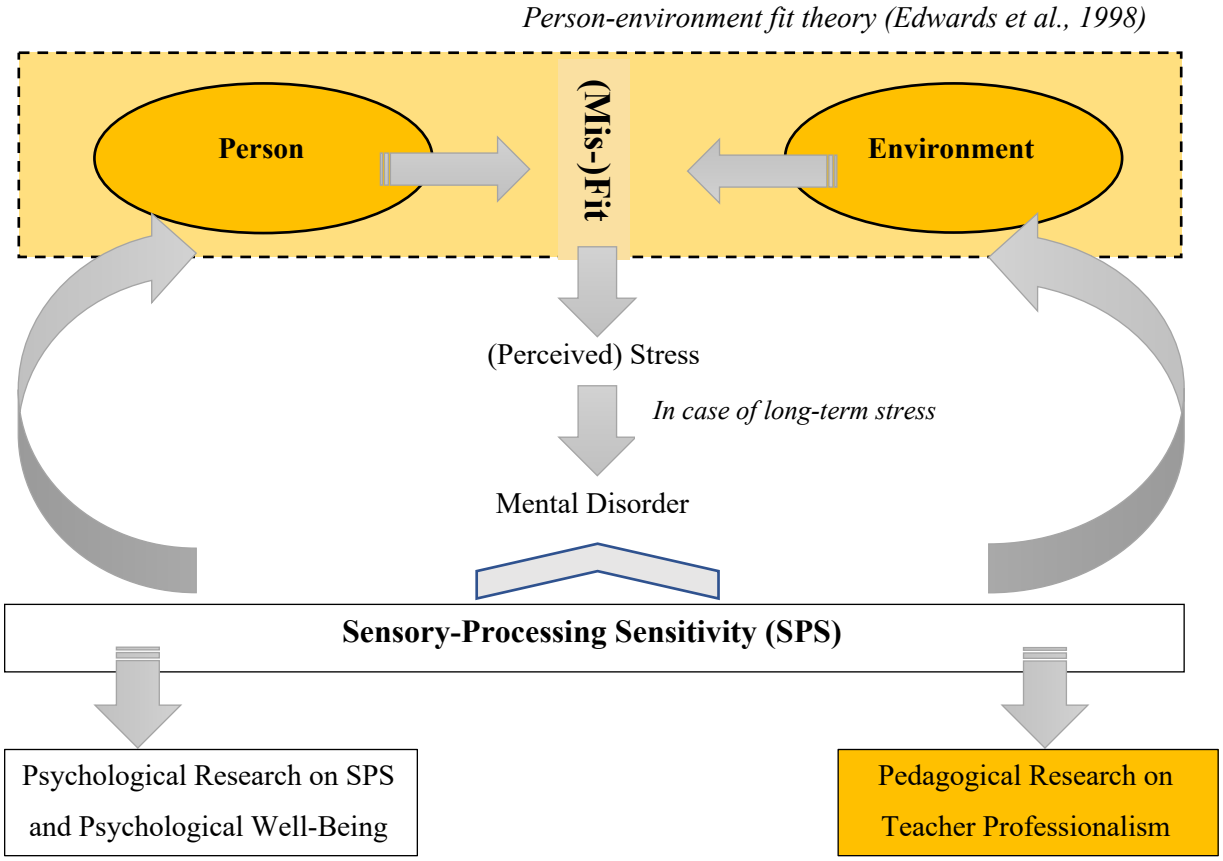

Figure 4. Own graphical depiction of the study's theoretical sections. Coloured parts represent the focus of the upcoming section.

As was already described above, the discussion on the influence of personality characteristics and the specific environment has been ongoing for the last decades (for an overview see Funder, 2001; Schütz et al., 2016; Wagerman & Funder, 2009; Zimbardo & Gerrig, 2016). However, considerable agreement has been found on the assumption that both do have an effect on people's behavior (e.g., Furr & Funder, in press). Many reasons lead to this conclusion, including empirical evidence (for an overview, see Furr & Funder, in press) and the fact that there is an interdependence between people (i.e., and their personality characteristics), their behavior and the particular situations (e.g., Gilbert, 1998). Furthermore, it has been suggested that this interrelation does not follow an additive nature. Furr and Funder (in press) describe this in the following way: "Behavior arises not simply from both person attributes *and* situation attributes, but from a process through which persons and situations shape each other's effects on behavior. Persons shape how situations impact behavior, and situations shape how a person's attributes impact behavior" (p. 12). Similarly, it has been suggested that "people select, modify, or create their own environment to some extent in line with their personality" (Asendorpf, 2008,

p. 120; Ross & Nisbett, 2011), and that, taking on the opposite perspective, genes are activated by certain environmental aspects (e.g., H. S. Friedman & Schustack, 2004).

Throughout the decades, different empirical and theoretical approaches to this interaction can be found from the ongoing debate in the literature. Furr and Funder (in press) summarized and extracted the most important approaches based on the perspective of personality psychology. Four of those approaches are described at this point (for an overview, see Furr & Funder, in press, pp. 12-26):

- "Contextualized person variables" (p. 12): This approach conceptually goes away from the definition of traits that has been applied in this study, which assumes a relatively stable disposition that affects behavior across situations. Rather, it assumes that characteristics are "more strongly connected to specific, relatively narrow situational stimuli or cues" (p. 12). The way in which people see their own characteristics, such as intelligence being fixed or stable in certain situations that require this skill is one example for this approach (e.g., Rattan, Savani, Chugh, & Dweck, 2015).
- "Focus on within-person variability and patterning of behavior" (p. 15): Summarizing this approach, it has been described as "a stable personality disposition that is defined by cross-situational behavioral variability" (p. 17). It therefore recognizes that people might behave different in different situations, but that there is still some observable tendency across time and situations that in turn can be linked to people's personalities.
- "Integrating traits with social/cognitive variables" (p. 20): with this approach, researchers draw connections between the personality traits as they are defined above and other constructs in the field of psychology that are assumed to be related to the context. One aspect that is important in this regard is, for example, people's motivation for their actions (e.g., Read et al., 2010).
- The fourth approach is called "person effects on situations" (p. 21): This is in line with the aforementioned assumption that people shape situations through "situational *selection* and situational *evocation*" (p.22; i.e., the presence of a person and his or her behavior affect a situation), as well as "situational *perception*" (p. 22; i.e., people perceive the same situation differently).

As can be seen in the description above, research on the person-situation interaction is numerous and diverse with some important questions that are still to be answered. However, at

the same time, it indicates a fundamental background for the assumption that both entities, the person and his/her characteristics, and the situation, have an influence on specific behavior, and even on each other.

This interaction has also been approached within the field of research on the teaching profession (i.e., the structural-theoretical perspective), related characteristics (i.e., the tolerance of uncertainty in teaching) as well as in line with teacher education and the question what teachers have to know and be able to do to be successful in their job.
While the first two aspects are the content of the following section (i.e., chapter 2.3.1.), the teacher educational perspective and the question about certain abilities and knowledge required for successful teaching will be the focus of the subsequent chapter (chapter 2.3.2.).

2.3.1. Tolerance of uncertainty and the structural-theoretical perspective of the teaching profession.

One basic characteristic of the teaching profession is the general structural uncertainty, which is the result of the insecure connection between intention, behavior and effect (Helsper, 2014; Lortie, 1975; Shulman, 1991). It is due to the complexity of the situation within a classroom and the number of elements that can influence the situations and teachers' reactions that led to the suggested uncertainty of educational action (e.g., Kiel & Pollak, 2011). This is, for example, the case during lessons in class: A student can talk and disturb the lesson at any time during the lesson, which would make the teacher to react spontaneously in a certain way. However, it also applies to learning, because successful learning can only be achieved if the student is willing to engage in this process and is, therefore, always uncertain (e.g., Dewey, 1933). Teachers, therefore, can often not be sure whether their teaching approach was successful or not as there are numerous variables within and outside the individual student that influence these outcomes (e.g., Labaree, 2000).
Another aspect of this uncertainty touches on the educational freedom teachers have: Within the range of teaching and educating behavior, and aside from the specific political restrictions, teachers are relatively free with regard to how they conduct and plan their lessons. One the one hand, this is an asset, while on the other hand, this also includes decisions on the execution of these tasks that are open and diverse, as described above (see chapter 2.2.1.2.; Rothland, 2013). To find the balance between these two aspects of everyday work life of teachers is one of the

major challenges. Furthermore, gaining the ability to successfully deal with this uncertainty is assumed to be one professional competency of teachers (Kiel & Pollak, 2011).
This uncertainty, together with the relationship between the teacher and the student, represents the rationale behind the structural-functionalist approach as first suggested by Talcott Parsons (1951, 1964) and later transferred to the teaching profession. The basic structure and framework with its "complex interactive dynamics" (Helsper, 2016, p. 103) led to ambivalences and tensions within the social and structural environment that are interpreted as almost not conquerable (p. 103) and represents the focus of this approach. In order to make these tensions better understandable, two examples are listed at this point.

Oevermann (1996), for example, defines the primary task of teachers as teaching knowledge and the secondary task as teaching norms. The classroom environment in which this is taught is described as being similar to that of a psychoanalytic therapeutic relationship: Teachers have a personal social relationship with their students, yet, conversely, there are objective demands and standards that make this relationship a dilemma for the teacher. In order to successfully overcome this dilemma, however, a voluntary collaboration between teacher and students is necessary. This is at the same time, seen as problematic when considering compulsory schooling regulations, hindering the required voluntary start of this relationship (see also Labaree (2000) for an international discourse of the topic).
Similarly, Luhmann (1984, 1991, 2004) describes the complexity and the contingency of the world, which is of particular importance with regard to the teaching profession as well. In particular, he describes the existence of a double contingency based on the interrelations between one's own and the other person's expectations and actions, which are always existent in social systems and relationships. As described above (see chapter 2.2.1.2.), this is of particular importance due to the fact that various expectations are an important characteristic of the teaching profession (e.g., Rothland, 2013).

In addition to the structural uncertainty, Helsper (1996, 2004) summarized a total of 11 antitheses teachers face in their professional lives that he calls antinomies (Helsper, 2002, 2016). With his antinomies, he represents accepted behavioral alternatives teachers can choose from throughout their professional lives. Representing everyday experiences in the teaching profession, these behavioral options are all either valid or mutually exclusive, inferring that

they cannot be realized at the same time. Some examples are the following (e.g., Helsper, 2002, pp. 77-85):

- antinomy of trust: trust (admitting need of help due to lack of knowledge, cognitive skills or mistakes by students) vs. mistrust (teachers' use of students' mistakes and insecurities in order to challenge understanding and broaden knowledge);
- antinomy of proximity: closeness (relationship with and responsiveness toward students) vs. distance (professional distance and neutrality towards the students; see also Labaree, 2000);
- antinomy of organization: standards (routines and rules within the organization 'school', such as class schedules and curricula) vs. openness for interaction (individual non-projectable and flexible interaction with students);
- antinomy of differentiation: equal treatment (expectation of homogeneous and fair treatment of students) vs. difference (individual support of particular groups and single students due to different backgrounds); and
- antinomy of autonomy: autonomy (teaching autonomy and independence as main goals of teaching) vs. heteronomy (students are dependent and not autonomous due to involuntary school context).

As these tensions are seen as almost not conquerable (Helsper, 2016, p. 103) teachers have to accept possible failure as part of their professional comprehension (e.g., Oevermann, 1996). Teachers' professionalism is represented by the ability to create teaching despite these uncertainties and contradicting demands (Kiel & Pollak, 2011; Rothland, 2013). Possibilities to prepare teachers for these challenges are gaining knowledge, experience and abilities to solve these critical situations, which is only possible through practical experiences (e.g., Helsper, 2016; Hericks, 2006). In some cases, when this goal is not reached, it is assumed to cause stress. Some of these abilities and demands are described in the upcoming section.

2.3.2. Various skills and knowledge defined as successfully interacting with the specific characteristics of teaching.

Although it has been agreed on that the teaching process is highly complex and influenced by various factors, it is important to prepare teachers in a way that they are able to handle these complex interrelations effectively. Numerous assumptions, theories and empirical findings about the skills, knowledge, and dispositions of successful teachers, and the requirements they

have to fulfill in their everyday work life, can be found in the literautre. They all follow the goal to improve teacher training and development, to evaluate teachers' performance and to be able to make teachers accountable for their actions (e.g., Baumert & Kunter, 2006; Creemers, Kyriakides, & Antoniou, 2013; McDiarmid & Clevenger-Bright, 2008).

While these aspects are summarized under the term demands and requirements in the German literature (Weiß, Schramm, & Kiel, 2014a, 2014b), conceptualizations in the international literature are more diverse and complex. On the one hand, for example, similar factors are found in the context of teacher capacity (for a definition of the term and its historical development, see Grant, 2008, pp. 127-129; or McDiarmid & Clevenger-Bright, 2008, pp. 135-140). At the same time, particularly in the English-speaking literature, theories and findings with regard to the question what a good teacher is have shifted toward teacher effectiveness (Borich, 2014, p. 4) and the particular factors that influence the success of teaching processes (Hattie, 2009, 2012; Helmke, 2007, 2012).

In order to present an excerpt of answers to the question what basic tasks in relation to the teaching profession exist, what factors influence the effectiveness of teaching and, consequently, what teachers have to know and be able to do in order to teach effectively, some example theories and models are described in the following section. Furthermore, in order to help understand the similarities and differences between the theories, they are described from three points of view: the normative, the model-theoretical (with a focus on empirically supported models) and additional empirical findings.

2.3.2.1. The normative approach.

Normative approaches describe what teachers should be able to do. One way to represent this standpoint is through the so-called standards for teaching that have been defined by different institutions across various countries. The aim of these standards is to define facets of teaching and related competences that are required for successful practice within the teaching profession. Comparing the described skills and competences across countries, it stands out that despite some minor differences, they also show major overlaps and similarities. They will be described on the basis of the political standards as defined by two countries, Germany and the United States of America, in the following paragraphs.

In 2000, the German ministers of education (Kultusministerkonferenz, KMK) defined six main tasks and competence areas (KMK, 2000, pp. 2-5; 2004, pp. 7-13). They include: teaching, educating, evaluating and innovating. Due to the fact that aspects related to variety and diversity within students have in recent years been of increasing importance and significance for modern education systems – one reason for this can be found in the ratification of The Salamanca Statement and Framework for Action on Special Needs Education in 1994, which consequently requires the application of an inclusive school system (UNESCO, 1994) -, the standards were adjusted in that regard in 2014. In particular, changes in the competence areas of Teaching and Educating have been realized: With regard to the competence area Teaching, it has been added that planning of lessons has to be made based on the variety of learning and developmental preconditions. As for the area Educating, it has been taken into account that teachers also have to know about students' possible disadvantages, impairments/disabilities, and barriers. Furthermore, it has been added that teachers have to teach appreciation and recognition of diversity (KMK, 2014, pp. 7-10).

Furthermore, similar documents with lists of standards that are comparable to the ones by Germany have been developed, such as in Australia by the NSW Education Standards Authority (2017). Furthermore, in 2015, the National Board for Professional Teaching Standards (NBPTS) in the U.S. published a document titled What Teachers Should Know and be Able to Do, representing standards certified teachers have to meet (NBPTS, 2015, pp. 11-39).

In order to depict the similarities and differences between the standards of different countries, the standards conceptualized by the German (i.e., also called competence areas) and the US-American government are contrasted in Table 3 below. Similar standards are aligned across columns. Because the focus of this section is on the standards and in order to keep it at a minimum length, the respective individual competences that are described in line with each standard are left out at this point.

Table 3

Comparison of German and US-American standards

German standards by the KMK (2014)	US-American standards by the NBPTS (2015)
Competence area 1: "Teachers are experts for teaching and learning" (pp. 7-8) • focus on planning, organization and reflection of teaching and learning processes • consideration of students' knowledge • individual assessment and systematic evaluation • motivate students • help students to learn by themselves Competence area 3: "Teachers fulfill their tasks of assessment and counselling during the lessons fairly and responsibly" (pp. 11-12) • necessity of high educational-psychological and diagnostic competences • evaluate students regularly and provide counselling in a transparent way • monitor students' development	Proposition 1: "Teachers are committed to students and their learning" (pp. 11-16) • acknowledgement of distinctive traits and talents of each learner • dedication to making knowledge accessible to students • passion about building meaningful relationship • attention to human variability, influence on learning and interconnection of people in different contexts • acquaintance with students across social and educational settings Proposition 2: "Teachers know the subjects they teach and how to teach those subjects to students" (pp. 17-22) • commitment to subject matter • acquaintance of students with the social, cultural, ethical and physical worlds; use of subjects as introductions to these worlds • pursuit of substantive knowledge, students' ability to explore domains and making connections Proposition 3: "Teachers are responsible for managing and monitoring student learning" (pp. 23-29) • perpetuation of high expectations; support of students to reach their potential; aim of creating vibrant, productive work spaces • adjustment and improvement of organizational structures • establishment of effective ways to monitor and manage learning environments • design of learning opportunities; plan and presentation of inspiring material to students; promotion of participation, support of discourse and long-term engagement • monitoring activities, observation of students' interactions, evaluation of performance • in and out of classrooms, an appropriate use of material, and a well-functioning learning environment

(continued)

German standards by the KMK (2014)	US-American standards by the NBPTS (2015)
Competence area 2: "Teachers are aware of their educational tasks" (pp. 9-10) • close collaboration with parents • readiness to find constructive solutions in cases of rearing or learning problems • have knowledge about diversity and inclusion in the learning context • knowledge about students' living conditions	
Competence area 4: "Teachers continuously develop their competences" (pp. 13-14) • knowledge about legal framework and ethics • participate in school projects • reflect their specific tasks and their position • perceive their professional role as an ongoing task to learn	Proposition 5: "Teachers are members of learning communities" (pp. 34-39) • engagement in wider communities of learning • connection with local, state, national and global groups and application of these resources for their own professional behavior • participation in duties that contribute to school quality and student learning collaboration with other professionals and partnership with families and other stakeholders Proposition 4: "Teachers think systematically about their practice and learn from experience" (pp. 30-33) • openness and dedication to continuous growth • willingness to expand repertoires, deepen knowledge and skills and to become wiser in rendering judgements • recognition of the need to welcome new findings and extend their learning • incorporation of ideas and methods by other educators • recognition of complexities, commitment to lifelong learning

Note. German standards retrieved from the Kultusministerkonferenz (KMK, 2014); American standards defined by the National Board for Professional Teaching Standards (NBPTS, 2015).

Table 3 above shows that although standards described in both countries have aspects in common, differences can be found as well, mainly with regard to the details these standards are described. The first competence area (i.e., "Teachers are experts for teaching and learning" (KMK, 2014, pp. 7-8) and the third one (i.e., "Teachers fulfill their tasks of assessment and counselling during the lessons fairly and responsibly", pp. 11-12) as defined by the German government, for example, are represented by three propositions in the American government (Proposition 1: "Teachers are committed to students and their learning", NBPTS, 2015, pp. 11-16; Proposition 2: "Teachers know the subjects they teach and how to teach those subjects to students", pp. 17-22; Proposition 3: "Teachers are responsible for managing and monitoring student learning", pp. 23-29). These areas specify the aspects of commitment to learning, subject matter, and methods to teach these subjects, in addition to the management as well as monitoring of students' learning. The same can be found at the following point: The fifth proposition developed by the American government (i.e., "Teachers are members of learning communities", pp. 34-39) and the fourth proposition (i.e., "Teachers think systematically about their practice and learn from experience", pp. 30-33), which describe the importance of teacher learning and collaboration with parents, families, stakeholders and other professionals, are both described by only one competence area in Germany, namely the fourth one (i.e., "Teachers continuously develop their competences", pp. 13-14). In comparison, the second competence area defined by the German government (i.e., "Teachers are aware of their educational tasks", pp. 9-10) cannot be found as detailed in the American standards. Although the focus counselling and providing additional support for students, is integrated in the remaining standards, it is not as prominent in the American standards.

Summarizing the normative aspects of teaching characteristics, it can be said that despite some differences, different countries particularly agree on the importance of the following aspects of teaching: teaching and learning methods, student diversity, collaboration with others, school development and teachers' continuing development, and professionalization.

2.3.2.2. The model-theoretical approach.

In addition to the aforementioned normative political tasks and standards defined by governmental institutions, there are also numerous theoretical approaches and models that have been supported by empirical findings on teachers' behavior, knowledge and skills. Two examples can be found below.

One popular and accepted study on teachers' competences is the so-called Cognitive Activation in the classroom-study (COACTIV) by Baumert, Kunter and colleagues (Baumert & Kunter, 2013). It influenced the discourse on the teaching profession in Germany, but also in the international, and mostly American, context (Cramer, 2016, p. 54). Within this framework, they aimed at making a "theoretical *and* empirical contribution to clarifying central concepts and to furthering the discussion on the professionalization of teachers" (Baumert & Kunter, 2013, p. 25). This was realized by a definition of specific "qualities that teachers need in order to meet the demands of their profession, with the main focus of interest being on classroom instruction" (p. 26). These qualities are called competences, which in this context, are seen as changeable and representing a combination of various aspects, including cognitive, "motivational, metacognitive, and self-regulatory characteristics" (Baumert & Kunter, 2013, p. 28). With their study, the research group around Baumert relates back to Shulman (1987), Bromme (1997b), and other experts (e.g., Bransford, Darling-Hammond, & LePage, 2005), who all developed aspects of knowledge teachers need in order to teach successfully. Furthermore, it represents one important theory (i.e., the competence-oriented approach) within the literature on professionalism of teachers as described above.

As a result of their integration of the professionalism perspective and literature on teachers' competences, they developed a model framework in which specific professional competencies are summarized, defined and made applicable for research purposes through various empirical investigations. Despite the focus on mathematical competencies and the fact that the study was realized with mathematics teachers, it is assumed to be generalizable.

In particular, they describe four factors that play an important role in the process of professionalization. Those are: specific declarative and procedural knowledge (competence in the narrow sense: knowledge and skills), professional values, beliefs and goals, motivational orientations, and professional self-regulation skills (Baumert & Kunter, 2013, p. 28). The following section offers a more detailed description of all four aspects and will conclude with a graphical depiction of the model.

- Knowledge and skills: Within this first aspect, Baumert and Kunter (2013, p. 28) differentiate between general pedagogical knowledge (i.e., knowledge about teaching and learning processes), content knowledge (i.e., understanding of concepts), and pedagogical content knowledge (i.e., knowledge about didactical approaches, ways of explaining

content and students' cognitions), first suggested by Shulman (1986) and later been empirically supported (e.g., Borko, 2004; Munby, Russell, & Martin, 2001). They further add the dimensions organizational knowledge (i.e., knowledge about the educational system) (e.g., Shulman, 1987) and counseling knowledge (i.e., diagnostic and communication skills) (e.g., Bromme & Rambow, 2001).

- Professional values, beliefs, and goals: within this aspect, Baumert and Kunter (2013) combine "value commitments, epistemological beliefs (world views), subjective theories of teaching and learning, and goal systems" (p. 37). Furthermore, they are all assumed to be related to classroom instruction.
- Motivational orientations: Furthermore, Baumert and Kunter (e.g., 2013) focus on the intrinsic motivational aspect (e.g., Pelletier, Séguin-Lévesque, & Legault, 2002), and in particular teacher enthusiasm, which is "typically understood to be a classroom behavior serving to enhance student motivation that may be more or less instrumental or strategic" (Baumert & Kunter, 2013, p. 39; see also Shuell, 1996). It has been assumed that this is realized through the behavior of enthusiastic teachers being a role model for student behavior (Baumert & Kunter, 2013). They draw on various theories, including the expectancy-value theory (Wigfield & Eccles, 2000), theory on individual interest (Krapp, 2000), and the self-determination theory by Deci and Ryan (2000).
- Self-regulation: Baumert and Kunter (2013) describe it as "the ability to responsibly manage one's personal resources" (p. 40). In the COACTIV model, control beliefs and self-efficacy beliefs are summarized under this aspect (e.g., Schmitz & Schwarzer, 2000), which have been found to be related to "experience of strain and sources of resilience in the teaching profession" (Baumert & Kunter, 2013, p. 38). This is realized through the "ability to regulate their psychological experience" (Baumert & Kunter, 2013, p. 39). Based on the work by Schaarschmidt and Fischer (1997), Baumert and Kunter (2013) applied an instrument assessing different types of regulation: "work engagement, resilience, and work-related emotions" (p. 40).

While these aforementioned aspects represent the first level of the model below (Figure 5), there are two more levels depicted in the model (Baumert & Kunter, 2006, 2013). These are:

- the second level, which includes various areas of competence (i.e., subject-related professional, subject-related didactic, educational-psychological, organizational, and counseling knowledge);

- in the third and final section, these areas are further differentiated into facets of competences, such as an understanding of the subject matter in mathematics as one facet of the subject-related knowledge area. Another example would be the area of educational-psychological knowledge, which could be described in more detail with the facets knowledge about assessment of performance, knowledge about learning processes, as well as knowledge about effective classroom management.

Figure 5 offers a more detailed depiction of the described model by Baumert and Kunter (2013).

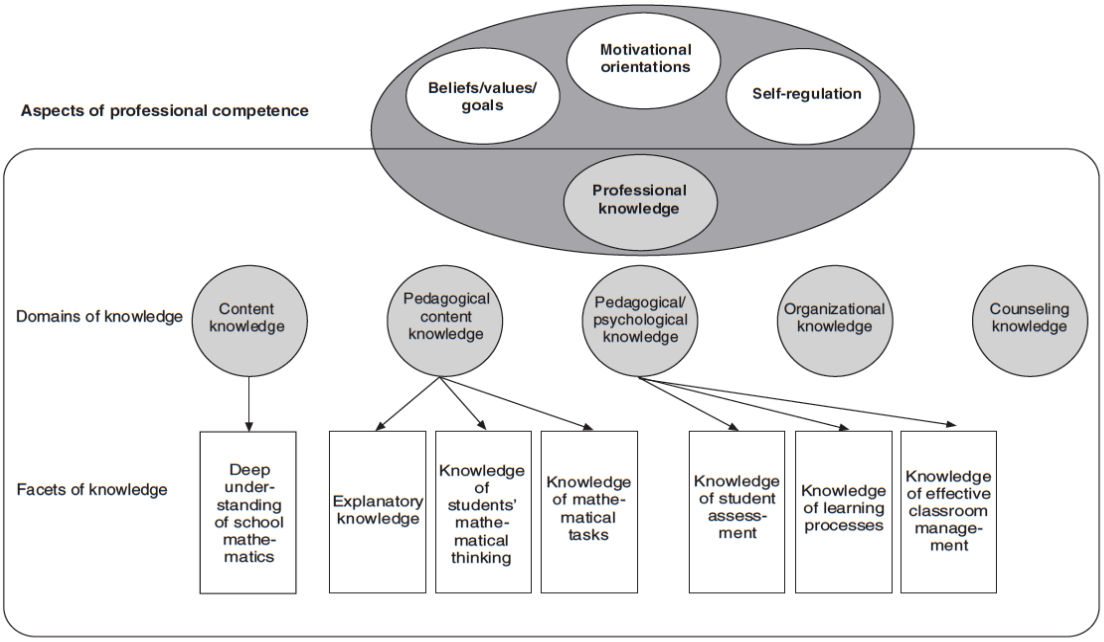

Figure 5. Model of Professional Competence as defined by Baumert and colleagues in the COACTIV study (from Baumert & Kunter, 2013, p. 29), originally developed in the context of Math but is assumed to be transferrable to other contexts.

A second popular theory represents the utilization of learning opportunities-model. It aims at describing the "complex effectiveness of instruction" (Helmke & Schrader, 2014, p. 149) in classrooms that are not described by simple process-product models (Helmke, 2009). Additionally, it does not only integrate different factors in a learning process, but also considers learning opportunities and processes as well as learning outcomes. Because it incorporates educational and psychological constructs on a more general level within the education context, it can be integrated into the field of instructional research as well as in that of educational psychology. In the literature, various versions of this model can be found
(e.g., Seidel et al., 2006), which all show a similar differentiation of the three levels specified

in the model, namely: opportunities, utilization of opportunities, and learning results (for an overview, see Seidel, 2014). These models represent a connection and integration of the process and the structural paradigm. While the process paradigm aims at describing learning processes in relation to various instructional characteristics, and the structural approach focuses on instructional structures and their effects on student learning, utilization of learning opportunities models considers both view points.

In this section, the model by Helmke (2007, 2009, 2012) is represented as one example of a utilization of learning opportunities model. It has been developed, among others, on the basis of a model by Helmke and Weinert (1997) and is widely accepted in the field of education.

The basic premise of this model is that instruction only "represents an offer to the students, which only leads to learning success *(learning effect)* if it is perceived, properly interpreted and used actively" (Helmke & Schrader, 2014, p. 149). Teachng, therefore "does not necessarily lead to *effects*" (Helmke, 2009, p. 74). Whether teaching leads to learning activities in the student is rather dependent on different factors that mediate this relationship. Among those factors are, for example, the interpretation of the teaching by the student or different "motivational, emotional and volitional (referring to the volition) processes" (p. 74) cognitive and motivational requirements, quantity and quality of instruction, professionalism, personality of the teacher and the classroom environment, to only name a few. In turn, these are also related to other, more complex, factors, such as the classroom context. All of the influences can also be seen in Figure 6 and will be described in more detail below.

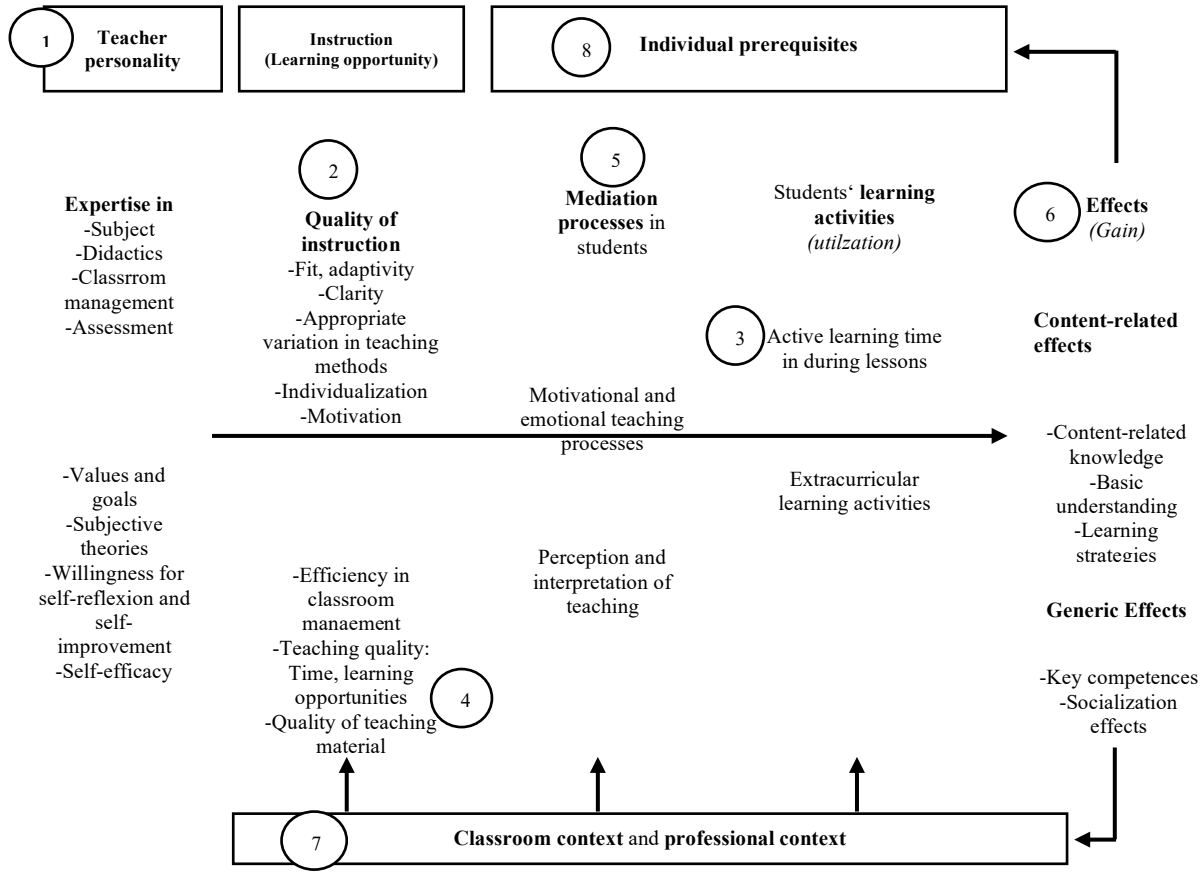

Figure 6. Utilization of learning opportunities model by Helmke (from: Helmke, 2007, p. 42). Content is translated and numbers are added by the author of the present study.

In the following, the different factors and underlying processes found in the model above are described shortly (see for example Helmke, 2007, pp. 42-43). The numbers in the upcoming section are equivalent to those in Figure 6 above.

1) Teacher personality and expertise: These are personal characteristics that can influence instruction, but "cannot be interpreted as aspects of instructional quality" (Helmke, 2007, p. 42). Examples are expertise and knowledge with regard to content, instruction and diagnostics. Similarly, those also include values and beliefs, self-concept, or self-efficacy.
2) Quality of instruction: With this aspect, the importance of high-quality instruction and related principles and characteristics is described. Some examples are clarity, teaching methods, or motivation.
3) Instructional quantity: Up to some specific time point, the time that is offered to and utilized by students to work on a specific content is important and has an effect on the later learning

outcome.

4) Quality of teaching and learning material: This aspect focuses on the quality of material that is available to students, which has a significant influence on student learning.
5) Mediation processes: Instruction does not directly lead to learning effects, but rather is mediated through individual processes of information processing. One mediator are the perceptions and interpretations of learning opportunities, while a second mediator represents learning and thinking processes, emotions and motivation.
6) Effects: In order to investigate effects of instruction, it is important to define specific goals and related criteria. Goals can, for example, be an increase in content-specific performance or social skills.
7) Role of the context: Contexts play an important role with regard to instruction in general and subsequent outcomes. There are three more general levels of context in the literature: age level, education level and the specific subject, all of which make an adjustment of instruction necessary. However, in his theory, Helmke (e.g., 2009) describes more contexts. Those include the class (such as social and cultural backgrounds, previous knowledge and skills, language skills, class size, classroom atmosphere and school context), as well the country, the cultural context and historical contexts are mentioned.
8) Family and learning potential: This aspect includes various individual preconditions of students (such as learning strategies, intelligence, or motivation; for more detailed information, see Helmke & Schrader, 2006), but also the family environment with regard to genetic but also social aspects, such as the parents' interest in education.

2.3.2.3. Additional empirical evidence.

While the aforementioned two models were analyzed empirically (i.e., the COACTIV model) or already have a foundation of existing findings on instruction (i.e., utilization of learning opportunities model), and the fact that "schools make decisions by fostering a 'culture of evidence' within the school" (McDiarmid & Clevenger-Bright, 2008, p. 147), not all of the aforementioned normative standards are based on the same level of empirical evidence. Looking at it from a different perspective, not all existing research findings are found in the models and theories described above. Therefore, to also offer a summary of further empirical evidence that is not found in the above mentioned models and standards, but is important and widely accepted in the field, the upcoming paragraph describes two additional cross-cultural example projects and studies: While the first project focuses on teachers, their perceptions of

demands and requirements, the second study offers a more general view of the effectiveness of various aspects with regard to learning outcomes.

Analyses of demands of the teaching profession

One empirical study that investigated certain demands perceived by teachers was realized at Ludwig-Maximilians-University in Munich, Germany. In particular, Kiel and his colleagues investigated demands teachers experience in their everyday work life in two different ways: First, demands that can be extracted in general and across schools types (Weiß, Schramm, & Kiel, 2014a, 2014b), and second, requirements and situations teachers in specific school types in Germany are facing, such as special needs education (e.g., Weiß, Kollmannsberger, Lerche, Oubaid, & Kiel, 2014; Weiß, Markowetz, & Kiel, 2017) or those working in school of the academic track (e.g., Weiß, Schramm, & Kiel, 2014a). Such findings have been published in German and English-speaking literature and can be taken as generally accepted: While some demands, such as content and didactical knowledge, openness with regard to interacting with students, empathy, ability to reflect, and general openness, to only name a few examples, were found to be similar across school types, the results differed when comparing the three main general school types in the German school system with the answers by teachers working in the special education area (e.g., Weiß, Kollmannsberger, & Kiel, 2013). Those demands were particularly found with regard to teachers' attitudes and the respective ethic foundation. An appreciative attitude, social skills as well as monitoring one's own mental health, which all relate to the more person-related characteristics in teachers, were found to play an important role specifically for special education teachers. Furthermore, the ability to handle heterogeneity appropriately, individualization of teaching methods and teaching materials, as well as counseling and different social skills, were found to represent professional demands teachers typically meet in this special needs context (e.g., Weiß, Markowetz, & Kiel, 2018).

Factors of effective teaching and learning: The meta-analysis by Hattie

A second example of relevant findings with regard to teaching and learning are those described by John Hattie (2009, 2012). In his popular publication Visible learning: A synthesis of over 800 meta-analyses relating to achievement (Hattie, 2009), he summarized effect sizes from various meta-analyses that investigated the influence of various aspects found within the school environment on school-related success. The investigated aspects were summarized into six general areas: the learners / students, the parental home, the school, the curriculum, the teacher

and instruction (e.g., Hattie, 2012). The average effect size across facets of teaching and learning was found to be $d = 0.40$ with individual effect sizes ranging between $d = 0.23$ (i.e., for the school environment) and $d = 0.47$ (i.e., for the role of the teacher; Hattie, 2012, p. 14). When analyzing the results with regard to the teacher, which is the focus of the present study, related approaches are found to be divided into "teacher as an 'activator' and the teacher as a 'facilitator'" (Hattie, 2010, p. 243) with the activating aspect revealing a significantly higher average effect size (i.e., of $d = 0.60$) than facilitation (i.e., $d = 0.17$). In particular, "reciprocal teaching", "feedback", and "teaching students self-verbalization" were found to be teaching strategies that were especially effective, with effect sizes ranging between 0.67 and 0.74 (Hattie, 2010, p. 243). Working conditions, as the second focus of the present study, in comparison, were only found to reach an average effect size of 0.08 (Hattie, 2010, p. 244). The highest effect size was found to be within-class grouping, which, however, still reached only a relatively small value of $d = 0.28$ (p. 244). However, these relatively low effect sizes do not "imply that classroom cultures are not critical" (Hattie, 2010, p. 247), which Hattie also points out in his book. Possible reasons for these effects are suggested to be the diversity of classrooms and the cultural effects (e.g., Hattie, 2009).

2.3.3. The personality approach within the field of teaching.

Different theories found in the field of personality psychology have also been applied to the teaching profession throughout the years. It aims at a systematic description of the teaching profession investigating typical patterns of teaching behavior and teacher characteristics on the basis of relatively general personality traits that are independent of specific situations (Cramer, 2016, p. 54). One popular scientist in the German literature advocating this line of research is Johannes Mayr and his research team (e.g., Mayr, 2014). Their main theoretical basis for these descriptions is the theory on the Big Five personality traits as described by McCrae and Costa (e.g., 2008; see chapter 2.1.2. for a more detailed description of this theory). Similar to the general definitions found in the field (see chapter 2.1.1.), teacher personality is defined as a "group of relatively stable dispositions that are important with regard to behavior, success, and the well-being in the teaching profession" (Mayr & Neuweg, 2006, p. 183). However, despite a long history of research and numerous empirical findings on teachers' personality, the question about whether such a "perfect personality constellation" exists and how it stands compared to other aspects related to the teaching profession, such as knowledge about content

or educational processes and theories, is still highly discussed among different theoretical approaches (e.g., Mayr, 2014, 2016).

In comparison, teacher's psychological characteristics, including for example personality characteristics and different attitudes, are summarized within the field of teacher effectiveness research in the international field. In particular, various studies can be found within the field of "process-product studies" (Creemers et al., 2013, p. 66) and are defined as "the early phase of TER" (i.e., Teacher Effectiveness Research; Creemers et al., 2013, p. 67). Evaluating this line of research, Creemers and colleagues state that:

> Although this approach produced some consensus on virtues considered desirable in teachers, no information on the relations between these psychological factors and student performance was provided …. In addition, even if some personality characteristics, such as emotional stability or the way teachers deal with problems, are probably important for effective teaching, there are no clear findings on which emotional or social characteristics, as measured by personality tests, are actually essential. With regard to attitudes, the fundamental problem is that teachers' attitudes do not give much information as to their actual classroom behavior. (p. 67)

They further add that the same is true for teachers' abilities, achievements and experiences, which leads to the fact that this line of research was not followed by researchers for much longer. Instead, the recent focus is more on teachers' behavior and how this is related to their teaching effectiveness (Creemers et al., 2013). This can be seen in the relatively big field of research on teacher effectiveness and related findings.

Based on this significant difference between the international and the German research field of teacher personality, the following paragraph focuses on the current research in the German literature as it yields more empirical findings. When investigating research conducted in this area, two main fields can be found: On the one hand, there are studies investigating the relationship between teachers' personalities and the perception of stress and the onset of ill-health; on the other hand, there is research on the relationship between personality characteristics or interests and teacher behavior. Due to the specific focus of the present research study, this section will focus on the relationship between various personality

characteristics and teacher behavior and perceptions. The relationship with teacher health will be the focus of a later chapter (i.e., chapter 4.5.).

2.3.3.1. The five factor model of personality.

With regard to the five factor model of personality, a summary of studies that have been conducted in German-speaking areas between the 1980s and 2014 revealed the importance of all characteristics. This is assumed to be due to the variety of tasks and characteristics related to the teaching profession. However, of specific importance are the traits Conscientiousness, Neuroticism, and Extraversion in the teaching profession. Table 4 below depicts an overview of relationships between personality traits and various variables related to the teaching profession, originally developed by Hanfstingl and Mayr (2007) and has been adapted and updated (Mayr, 2014).

Table 4

Summary of Relationships between the Big Five Personality Traits and Variables Related to Teaching Experiences and Practice

Criteria	Personality trait				
	N	E	O	A	C
Learning Strategies (during studies)	~	~	++	+	+++
Academic performance and knowledge	--	0	+	~	++
Practical performance (grades)	-	+	0	0	++
Educational decision making and responsibility (during internship)	--	++	0	+	++
Perceived strain during practice phase	++	--	0	0	---
Contentment with studies	~	+++	++	+	+++
Educational decision making and responsibility (at the work place)	--	++	++	0	+++
Perceived strain at the workplace	+++	--	~	~	~
Contentment with the job	---	++	++	++	+++

Note. Table is part of table found in Mayr (2014, p. 198). Translation and adjustments with regard to the sequence of the criteria made by the author of the present study.
-, --, --- = negative relationship based on the particular effect size; +, ++, +++ = positive relationship based on the particular effect size; 0 = no relationship found; ~ = contradicting results found; N = Neuroticism; E = Extraversion; O = Openness for experience; A = Agreeableness; C = Conscientiousness.

2.3.3.2. Vocational personalities and general interests.

A second group of characteristics often investigated in the teaching profession are those called vocational personalities (Holland, 1985, 1997) or general interests that are defined as being related to a person's enjoyment while engaging in something related to the area of interest as well as personal satisfaction and moral concepts (Krapp, 2006). One view that has been established with regard to personal interests is that of interpreting interests as personality traits, which develop throughout childhood and are assumed to be stable afterwards (e.g., Mayr, 2014, 2016). Based on this definition, the most popular model is the six-factor theory by Holland (1997), which –similar to the Five-Factor model of personality - enables a description of a person in relation to the particular vocational environment.

Holland (1996) describes that "it is useful to characterize people according to their resemblance to six personality types" (p. 397). Furthermore, he states, "that congruence of person and job environment leads to job satisfaction, stability of career path, and achievement" (p. 397). How exactly individuals tend to be, and which occupation would fit best to their personalities is described based on the extent to which they represent the six areas of orientation, which include the following (Holland, 1996, p. 399):

- realistic (i.e., practical accomplishment; example occupation: carpenter, truck operator);
- investigative (i.e., skepticism and persistence in problem solving; example occupation: psychologist, microbiologist);
- artistic (i.e., literary, artistic or musical accomplishment; example occupation: musician, interior designer);
- social (i.e., empathy and sociability; example occupations: counselor, clergy member);
- enterprising (i.e., initiative in the pursuit of financial or material accomplishment; example occupations: lawyer, retail store manager); and
- conventional (i.e., organizational ability, dependability; example occupations: production editor, bookkeeper).

Furthermore, it has already been suggested that the five general personality traits and the general areas of interests are related (e.g., Costa, McCrae, & Holland, 1984; Larson, Rottinghaus, & Borgen, 2002). As an example, a relationship between the artistic orientation and openness to experience and between the enterprising orientation and extraversion, have been found (Larson et al., 2002). Based on those findings, general interest dimensions have already been applied in the investigation of the teaching profession as well. Specifically, these

lead to findings of high values in social orientation being typical and advantageous for the teaching profession. Dependent upon school type and subject, other dimensions are found to play an important role as well, such as the artistic and the enterprising dimension for elementary school teachers (Mayr, 2014). Table 5 below summarizes findings investigating the relationship between general interest and different criteria of the teching profession.

Table 5

Summary of Relationships between General Interest Dimensions and Variables Related to Experiences during Teaching Studies and Practice

Criteria	Interest dimension					
	RO	IO	AO	SO	EO	CO
Learning Strategies (during studies)	+	++	++	++	++	+
Academic performance and knowledge	0	0	+	+	0	0
Practical performance (grades)	0	0	0	+	0	0
Educational decision making and responsibility (during internship)	+	+	+	++	++	++
Perceived strain during practice phase	-	0	0	-	-	-
Contentment with studies	0	++	++	++	++	+
Educational decision making and responsibility (at the work place)	+	+	+	++	+	+
Perceived strain at the workplace	-	0	0	0	--	--
Contentment with the job	0	0	+	+	+	+

Note. Table is part of the table found in Mayr (2014, p. 198). Translations and adjustments with regard to the sequence of the criteria is made by the author of the present study. Dimensions of interest are based on conceptualizations by Holland (1996).
-, --, --- = negative relationship based on the particular effect size; +, ++, +++ = positive relationship based on the particular effect size; 0 = no relationship found; ~ = contradicting results found; RO = Realistic Orientation; IO = Investigative Orientation; AO = Artistic Orientation; S = Social Orientation; EO = Enterprising Orientation; C = Conventional Orientation.

2.3.3.3. Additional personal characteristics.

A third group of characteristics found within the research on the teaching profession, and based on personality theories, is represented by additional specific personal characteristics. These characteristics are also very popular among researchers and people working in education and include aspects such as self-efficacy (Bandura, 1994). They have also been found to be related to some of the Big Five personality traits (Mayr, 2014), enthusiasm, interests specific to the teaching profession, or tolerance of uncertainty (König & Dalbert, 2007), as already broached in one of the antinomies by Helsper (1996; see chapter 2.3.1.). In particular, a negative relationship between teacher burnout and self-efficacy has been found in both German studies

(e.g., Schmitz & Schwarzer, 2000, 2002) and also the international field of research (e.g., Aloe et al., 2014; I. A. Friedman, 2003). Self-efficacy in teachers was described as "teachers' beliefs in their capabilities to organize and orchestrate effective teaching-learning environments" (Creemers et al., 2013, p. 73). In line with this, Soodak and Podell (1996) found different factors that make up teacher self-efficacy: personal efficacy, outcome efficacy, and teaching efficacy. Furthermore, self-efficacy has been found to be able to predict behavioral aspects in general (e.g., Pajares, 1996) and related to the teaching profession (e.g., Schunk, 1991). On the other hand, interests specific to the teaching profession have been found to be beneficial with regard to various aspects, including performance, competencies and contentment in the teaching profession (for an overview, see Mayr, 2014). Tolerance regarding the existing uncertainty and ambiguity in the teaching profession has also been found to be positively related with teacher health based on German samples (König, 2003). Furthermore, in the international research field, control over workplace characteristics has been found to relate to teacher burnout (Tuettemann & Punch, 1992). These examples show again the diversity of the research field of personal characteristics.

2.3.4. The role of teachers' emotions in everyday school life.

Although "along with motivation and cognitions, psychologists now recognize emotions as one of the three fundamental classes of mental operations" (R. E. Sutton & Wheatley, 2003, p. 332), the literature and research on teacher emotion have only been increasing for the last two decades and only these days "is now regarded as an important field of research" (Fried, Mansfield, & Dobozy, 2015, p. 416). When aiming at defining emotions, numerous different approaches can be found. They are still difficult to define as many researchers do so based on their own theoretical background (e.g., Fried et al., 2015). The fact that emotions are multi-componential is one aspect that researchers across disciplines agree on. The specific components are very similar across theoretical approaches and include appraisal (i.e., "judgment or *appraisal* … in terms of its significance or relevance for the individual's motives, goals or concerns" (R. E. Sutton & Wheatley, 2003, p. 329)), "subjective experience" (i.e., "a distinct type of private mental state" (p. 330)), "physiological changes and emotional expression" (i.e., "affecting, for example, body temperature, heart rate, and blood pressure" (p. 331)) and "action tendencies" (i.e., "also called action readiness or response tendencies" (p. 331)) (for an overview, see Sutton & Wheatley, 2003, pp. 329-332), which are all assumed to be related to each other to some extent. The process that would follow the onset of emotions is called emotion regulation, which

"refers to the unconscious and conscious processes by which individuals influence *which* emotions they have, *when* they have them, and how they express these emotions" (R. Sutton, 2004, p. 379).

Given this importance in the literature, and the fact that they accompany everybody everyday throughout his or her life, it might not be a surprise that emotions are also very important in research with teachers as well. It is even a significant aspect, considering that "teachers are constantly exposed to emotionally provocative situations and have limited options for self-regulation when a situation provokes a strong emotional reaction" (Jennings & Greenberg, 2009, p. 497) as well as their unique role in the classroom and the specific characteristics of the profession (e.g., Skaalvik & Skaalvik, 2016). This relevance, and complexity of the research field, is also indicated by the fact that emotions are found with regard to numerous research areas, such as teacher stress, teachers' accountability and high-stakes testing, the relationship with students, their emotions, learning, or motivation, to only name a few examples (for an overview, see Fried et al., 2015). Consequently, this is also true for the present study. Looking at the theoretical background outlined in the previous chapters, it can be seen that emotions play a role in almost all broader topics: On the one hand, they play an important role with regard to stress research, particularly with regard to coping mechanisms (e.g., Lazarus, 2006), the effects of stress on a cognitive and emotional level (e.g., Kaluza, 2011a), or in the model of depression as suggested by Beck (e.g., 2008). On the other hand, emotions are found in research on the teaching profession itself and related characteristics, including, for example, self-regulation as one area of teachers' suggested competences (e.g., Baumert & Kunter, 2013), or as a mediating variable in students in the investigation of teaching and instructional effectiveness, as suggested in the utilization of learning opportunities model by Helmke (e.g., 2007). Similarly, teachers' individual perception of specific characteristics has been found to be highly related to their satisfaction with their professional lives and possibly also the wish of leaving (e.g., Jennings & Greenberg, 2009). Finally, emotions represent one of the core characteristics of SPS. In particular, the deeper information processing that goes along with this trait is assumed to be "driven by stronger emotional reaction, positive and negative" (E. N. Aron et al., 2012, p. 263), making emotions critical to the SPS construct in this regard. Given the outlined relevance of emotions for the present study, but also its complexity and numerous findings that have been generated throughout the last decades, the following sections aim at introducing and defining emotions and summarize some of the most crucial findings for the

present study. Based on its focus, those results are differentiated into two areas of research: First, the role of emotions in teacher stress, in this case viewing emotions as a reaction to the specific characteristics of the teaching profession, and psychological well-being, and, secondly, the role of emotions in relation to other personality traits and other personal characteristics.

2.3.4.1. Emotions and psychological well-being.

As already stated above, numerous studies investigated the relationship between emotions and stress (for an overview, see Jennings & Greenberg, 2009). A vast percentage of these studies focus on burnout as emotional exhaustion, which is considere a "key component of burnout" (Maslach & Jackson, 1986; Zapf, 2002, p. 256), in addition to depersonalization and reduced personal accomplishment. It is argued that, in the long run, it can lead to mental disorders, such as depression (for a more detailed line of argumentation see the paper by the Deutsche Gesellschaft für Psychiatrie, Psychotherapie und Nervenheilkunde (DGPPN, 2012)). In line with this, emotional stress is assumed to "rank as the primary reason[s] teachers become dissatisfied and leave teaching" (Jennings & Greenberg, 2009, p. 497).

For example, suppression has been found to be related to more negative emotions, as participants who tend to suppress emotions "score lowest in the domain of positive relations with others; they also have lower levels of self-esteem, are less satisfied with life, and have more depressive symptoms" (Gross & John, 2003, p. 360). Furthermore, they are generally found to be "less successful at mood repair, and view their emotions in a less favorable or accepting light, ruminating about events that make them feel bad" (p. 360). Similarly, Montgomery and Rupp (2005) found that "the degree in which teachers emotionally respond to stressful events and how satisfied they are as a consequence … has a strong influence on the degree of burnout they experience" (482). It has further been suggested that people are more vulnerable to emotional exhaustion and burnout if a different emotion is expressed than the specific emotion that is felt, mainly due to the effect on the quality of the experience (Zapf, 2002). In this line, the study by Rey, Extremera, and Pena (2016) suggested that people "being poor emotionally at perceiving and managing emotions also tend to report feeling exhausted more often" (p. 8). Simiarly, "teachers' burnout and low job satisfaction … is likely to be preventable, if they are helped to enhance their EI" (Platsidou, 2010, p. 73), with EI standing for emotional intelligence and being conceptualized as a "trait" which is "likely to be one of the personality characteristics that possibly affect the experience of burnout an job satisfaction

in teachers" (p. 61). Looking at it from a more positive point of view, in this case with regard to well-being, high emotion-related abilities were positively related to positive affect. Furthermore, positive affect also mediated the relationship with job satisfaction (Brackett, Palomera, Mojsa-Kaja, Reyes, & Salovey, 2010). This is particularly important given that positive emotions are assumed to increase the ability to apply efficient emotion regulation. Furthermore, positive emotions were found to rehabilitate in a physiological way from stressful life events and the emotional consequences, which, in turn can help prevent physiological illnesses in the long term (Tugade & Fredrickson, 2004). From a third and final perspective, social relationships, in this case teachers' relationship with the students, were found to be associated with less negative emotions, and rather more positive emotions in the classroom, which consequently, also leads to lower levels of emotional exhaustion (Taxer, Becker-Kurz, & Frenzel, 2018). In line with this, the relationship between teachers and their students have been found to play an important role in a way that the it can enhance positive emotions and prevent the experience of negative emotions (Klassen, Perry, & Frenzel, 2012).

2.3.4.2. Emotions and personal characteristics.

A second focus of the present study is the inter-individual differences with regard to personality traits and other personal characteristics that are also found to play an important role in emotion research. The study by Kavanaugh and Bower (1985), for example, suggested a negative relationship between negative emotions, or in this study mood, and self-efficacy, which in turn can result in burnout. Similarly, Lohbeck, Hagenauer, and Frenzel (2018) revealed evidence for a relationship between emotions and teachers' self-concepts, in this study defined as "a person's self-perception of abilities in specific domains" (p. 112). In particular, all self-concepts were found to be associated with the positive emotion of enjoyment, as well as with the negative emotions included in the study (i.e., anxiety and anger). However, results changed slightly when including all of them into a model "as predictors of each of the three emotions" (p. 117). Namely, "only self-concept of pedagogical skills was significantly positively linked to enjoyment and negatively linked to anger" (p. 117). The only significant association with anxiety in this kind of analysis was found with regard to subjective content knowledge.

As already stated above, another highly relevant construct in the teaching profession is the aspect of uncertainty (e.g., Helsper, 2014; Lortie, 2002; Shulman, 1991). In emotion research, it has been suggested that happiness and anger are "appraisals of certainty" (see for example

Baas, de Dreu, & Nijstad, 2012, p. 1004), while fear and sadness are "appraisals of uncertainty" (p. 1004). Furthermore, emotions (or moods) were found to trigger structured thinking. In particular, Baas revealed empirical evidence for the fact that emotions related to "uncertainty (fear and sadness) led to more structured idea generation than emotions that are associated with appraisals of certainty" (p. 1011), which has implications for psychological well-being: Individuals, who are depressed, for example, have been found to "engage in prolonged and systematic thinking …, tend to brood about failed goals, generating corrective thoughts" (p. 1004), leading to the perception of uncertainty as being one characteristic of the teaching profession that might play an important role in the interrelation between emotions, psychological well-being and personal characteristics.

Finally, studies have also investigated the relationship between emotions and related measures and personality traits, such as the one by Joseph and Newman (2010). In their study, they investigated the relationships between emotional intelligence and its sub-facets (i.e., self emotion appraisal, others' emotion appraisal, use of emotion, and regulation of emotion) and the Big Five personality traits (i.e., using the international personality item pool (Goldberg et al., 2006)). Results revealed that the two aspects of others' emotion appraisal and use of emotion "shared more than 50% of their variance with agreeableness and conscientiousness, respectively" (p. 689), indicating a significantly and relatively strong relationship. Furthermore, neuroticism was also significantly related to self emotion appraisal and regulation of emotion. However, these relationships were not as strong.

3. Recent Developments in Line with the Interactional Approach in Personality Psychology: Sensory-processing sensitivity and Other Related Theories

In the last few decades, various theories describing individual differences with regard to people's sensitivity toward the environment and related stimuli have been suggested. One of these theories, sensory-processing sensitivity (SPS), was brought into the scientific field with a theoretical foundation in personality psychology and represents the focus of the present study. The upcoming chapter describes the development, theoretical background, measurements and research findings related to the trait of SPS before, subsequently, in chapter 3.9. the remaining related models (i.e., differential susceptibility, biological sensitivity to context, vantage sensitivity) as well as the meta-theory of environmental sensitivity, which also includes SPS, is

introduced. In the graphical depiction of the theoretical content of this study (see Figure 7), it represents the basis and main focus.

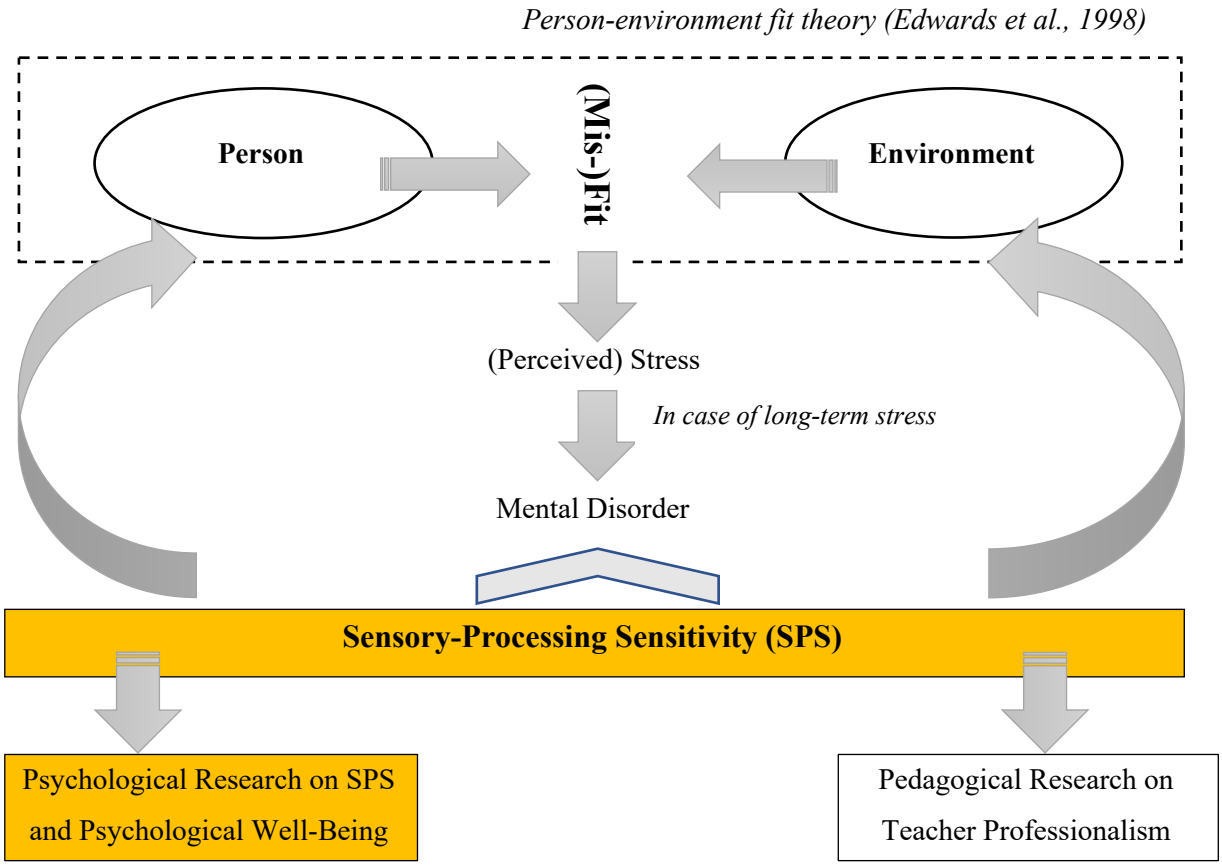

Figure 7. Own graphical depiction of the study's theoretical sections. Coloured parts represent the focus of the upcoming section.

SPS was first brought into the literature by Elaine N. Aron and her colleagues in 1997. Due to the important role of the trait in the present study, the following offers a summary of important background information of the trait: After a definition (chapter 3.1.), the theoretical background of the trait of SPS will be illustrated (chapter 3.2.). Next, the measurement of the underlying scale (chapter 3.3.) and its distribution in the population (chapter 3.4.) will be the focus before its relationship with other personality-related characteristics (chapter 3.5.) and variables of negative affect (chapter 3.7.) is described. Finally, in addition to the role of SPS in the workplace (chapter 3.8.), some criticism of the trait found in theliterature (chapter 3.10.) are outlined. As already described above, chapter 3.9. focuses on SPS as one aspect of environmental sensitivity and outlines the other theories that have been suggested in line with it.

3.1. Defining Sensory-Processing Sensitivity

SPS is assumed to be "an underlying phenotypic (temperament) trait" (Greven et al., 2018, p. 3) that has its origin in inter-individual difference in the depth of information processing (E. N. Aron & Aron, 1997). Particularly, in the literature, people who are assumed to inherit the trait, are called Highly Sensitive Persons (HSPs), and have been described as those, who process information in the environment and within themselves, more deeply than other people, no matter whether these are positive or negative in nature. Consequently, they are more sensitive toward and also aware of environmental stimuli, including those very subtle. At this point it is important to note that the aspect of information processing follows the patterns defined by Craik and Lockhart (1972) and does not reflect better functioning of sensory organs. Rather, they define a process of deeper processing as going through different stages of analysis, which do not represent a fixed sequence. They describe that people might "perceive at meaningful, deeper levels before perceiving results of logically prior analyses" (p. 675). The different stages include the perception of physical and sensory features, comparisons of new input features to prior experiences, the process of storing the information, abstraction as well as mechanisms of further processing including the creation of associations, enrichment, or elaboration. This conceptualization represents the connection to the aforementioned aspect of sensitivity to stimulation, further supporting its independence of differences in peoples' sensory organs, as already described above and agreed on by all researchers investigating the trait. Furthermore, it has been suggested to be "driven by stronger emotional reactions, positive and negative" (E. N. Aron et al., 2012, p. 263), making this aspect of emotional affectivity another important characteristic of HSPs.

One further aspects that can be observed in people with the trait is that they like to "'pause to check' in a novel situation" before acting in any way (E. N. Aron et al., 2012, p. 263). Due to this elevated level of information processing the "need to take frequent breaks during busy days" (E. N. Aron & Aron, 1997, p. 351) is very important for the so-called HSPs. If it is not possible for people with the trait to have get breaks in order to reduce stimulation this might result in overstimulation as another important characteristics related to the trait (e.g., E. N. Aron et al., 2012; Greven et al., 2018; Homberg, Schubert, Asan, & Aron, 2016).

Although these features offer a good first overview of certain characteristics of the trait, it is important to keep in mind that the characteristics "also are oversimplifications, at least as

behavioral indicators of SPS" (E. N. Aron et al., 2012, p. 268). In the upcoming chapters, particularly the next one, these characteristics will be described in more detail.

3.2. Development of the Trait and its Theoretical Background

SPS was brought into the literature on human personality trait as a meta-trait of general sensitivity. Investigating various already established theories and studies of interaction effects led to the conclusion that such a trait has already been investigated implicitly but has not been the focus of any of the universally accepted personality concepts. The theoretical basis is therefore diverse. Some example theories that create the background of the theory of SPS are described in the upcoming sections. In particular, they follow four of the aforementioned aspects described in the definition, namely inhibition of behavior, sensitivity to stimuli, depth of processing, and emotional / physiological reactivity. For each aspect, the theory is shortly described and further extended by those characteristics that are related to SPS as defined by Aron and her colleagues (e.g., E. N. Aron & Aron, 1997; E. N. Aron et al., 2012).

Theories referring to the inhibition of behavior include the suggestion of the behavioral inhibition system by Gray (1981) and Kagan's term "behavioral inhibition to the unfamiliar" (Kagan, 1989, p. 1). Additionally, the theory on introversion by Carl Jung (1961) also include aspects of behavior inhibition, such as the preference to observe, tendency to reflect, and relating situations to own previous experiences. In comparison, extraversion is connected to the preference to learn through direct contact. Further investigation, however, revealed findings indicating that this inhibition of behavior is not due to fear, but rather that it might represent responsivity (e.g., Bar-Haim et al., 2009; Gunnar, 1994). Along with these theoretical implications, one major tendency of an HSP is the aforementioned tendency to hold back before acting (E. N. Aron et al., 2012). E. N. Aron and colleagues (2012) further add, that

> we cannot expect inhibition of behavior in all or even most situations involving responsivity because the current situation may already be so familiar that there is no need to pause to check. In this case, sensitivity might lead to a faster than average response. This aspect also might better be termed *inhibited/planned behavior*, in that responses already decided upon can also inhibit behavior - sometimes prior experience dictates that there is no need to act. Thus, the meaning of inhibition and even its presence is questionable unless a sensitive person is faced with a completely novel or unusually conflictual situation, as when the relative costs of the usual choices are higher than

> normal (e.g. situations when one has special reason to fear judgment, leading to shyness; (E. N. Aron, 2000). (E. N. Aron et al., 2012, p. 268)

Sensitivity to stimuli represents a second characteristic dimension of SPS. Related aspects go back to the aforementioned research on temperament in children by Thomas and Chess (1977) as well as Rothbart and Bates (2006). While Thomas and Chess define sensitivity threshold as one of the nine basic traits, which in combination with social withdrawal would lead to a "slow-to-warm-up child" (see also Thomas, Chess, & Birch, 1970), Rothbart and Bates (2006) advanced these traits and suggest two behavioral tendencies in children: Perceptual sensitivity as one aspect of effortful control, and discomfort caused by stimuli as one aspect of negative affectivity. Additionally, the theory of stimulus screening and arousability by Mehrabian (1976) supports the assumption of a general sensitivity. He states that some people are more sensitive to stimulation, which in turn leads to arousability. At this point, it is worth mentioning the aforementioned research supporting introversion as representing sensitivity (for an overview, see Koelega, 1992). This dimension represents HSPs' tendency of a lower threshold of stimulation, leading to being overaroused and overwhelmed by various stimuli more easily. These stimuli do not only have to be in the environment but can also be of physical nature and due to reactions of one's own body. In particular, the fact that they are easily overwhelmed by crowds, noises or unexpected changes as well as other sensual stimuli, such as odors, or visual stimulation. In support of stimuli in the self, HSPs are assumed to be more affected by pain, hunger, caffeine, or medication as well and might be more prone to allergies (E. N. Aron & Aron, 1997). Due to this lower threshold of overstimulation, the "need to take frequent breaks during busy days; their conscious arrangement of their lives to reduce stimulation and unwanted surprises; the importance of their spiritual and inner lives" (E. N. Aron & Aron, 1997, p. 351) are also stated as being prevalent. However, when inspecting this aspect of the trait, it is important to note once again the repeatedly stated fact that this sensitivity to different stimuli and the consequence that more information from the environment is processed, is not due to a better functioning of the sensory organs, but rather due to processing of a higher rate of information (e.g. E. N. Aron & Aron, 1997). This point is discussed in more detail in the following paragraph.

The third dimension, called depth of processing, refers to the study by Patterson and Newman (1993) already described above. In their study, they found that introverts needed more time after a task in order to reflect the particular feedback they got but revealed better results in the

end. Similarly, D. M. Robinson, Moeller, and Fetterman (2010) investigated people's response to error feedback but based on the trait of neuroticism. Both sets of results revealed two important findings: First, people differed with regard to the tendency to slow down after they have been given negative feedback over different cognitive tasks, and second, the reasons for why slowing down also differed. In particular, they found that among people who slowed down more significantly, those high in neuroticism made more mistakes, but those low in neuroticism revealed above-average results. This can be interpreted in a way that people high in neuroticism slowed down due to anxiety. On the other hand, participants with low levels of neuroticism might have slowed down to notice what they did wrong and corrected it. Although the authors concluded that this might be due to a lack of negative emotional reactivity, E. N. Aron and colleagues (2012) state that they "do not consider that a greater-than-average positive feeling following being accurate or a different type of negative affect (perhaps not affecting self-esteem) might be assisting the nonneurotics who slowed down" (p. 270). These characteristics are in line with established aspects of defining SPS. In particular, it is assumed that HSPs process information more deeply, which includes thinking long about things that happened to them and the experience of something that hasn't been actively thought about for a while suddenly coming up in one's thoughts again. Furthermore, it is suggested that HSPs think deeply about serious and fundamental topics, such as death, illnesses or the meaning of life (e.g., E. N. Aron, 1997). Finally, the reported results are of importance for research on SPS as it is assumed that the majority of HSPs are introverted (for a more detailed description, see section 3.5.1.), and that, given certain conditions and negative experiences during childhood, might be more prone to negative affect and emotionality (e.g., E. N. Aron et al., 2005).

The fourth and last dimension includes the emotional / physiological reactivity as one important aspect of SPS. This characteristic differs from the other ones, because emotional reactivity can also occur for other reasons, such as posttraumatic stress disorder or neuroticism, or explain other behavioral characteristics, such as caution, shyness or introversion. E. N. Aron and colleagues (2012) therefore argue that although it is one of the most prominent characteristics of SPS, it is only one aspect. It is assumed that greater reactivity supports the process of learning how to react in particular situations and that an interaction of general sensitivity and the environment is responsible for negative affect or emotionality rather than a genetically determined trait. Furthermore, they suggest that HSPs are used to their higher reactivity and are able to regulate it. The main difference between the higher reactivity of an HSP and neurotics

would be the accuracy of decisions in certain situations. While neurotics might make inaccurate decisions due to their history of negative situations and the related expectation of negative feelings, sensitive people would make choices that are more accurate due to their regulation methods already mentioned above (E. N. Aron et al., 2012). In the definition of SPS, the aspect of greater reactivity can be mainly found in connection with aspects of deep affection by the arts or a stronger emotional reaction to certain situations or experiences (E. N. Aron & Aron, 1997).

3.3. Measuring Sensory-processing sensitivity: The HSP Scale and other Measurements

"The whole trick of science is to test ideas against reality, and in order to do that, something has to be measured" (McCrae & Costa, 1990, p. 33). This simple, yet at the same time essential statement, is a perfect introduction to the following paragraphs as it applies to research on personality in general and, consequently, SPS. In order to be able to measure the trait of SPS in people, E. N. Aron and her colleagues developed an instrument called the Highly Sensitive Person Scale (HSP scale). The following sections will describe the developmental process of the scale as well as its psychometric properties, including reliability, validity and objectivity.

3.3.1. The development of the Highly Sensitive Person Scale.

The first step in the identification process as well as the development of the trait were qualitative in-depth interviews, each taking around three to four hours, with participants in California, USA. The recruitment of volunteers for the interviews was realized through announcement in a newsletter, which asked for voluntary participation of people who are "either highly introverted (for example, preferring the company of one or two people) or easily overwhelmed by stimulation (such as noisy places or evocative or shocking entertainment)" (E. N. Aron & Aron, 1997, p. 350). Additionally, it was made sure that "an equal distribution of genders and across decades of age and a variety of vocations (although 12 of the 39 were students)" (E. N. Aron et al., 2012, p. 272) was sampled. E. N. Aron and Aron (1997) state that "the respondent was viewed as a collaborator in the exploration of the concept, and both the interviewer and respondent were free to digress and explore particular issues" (p. 350). This approach generally follows the multi-method approach, which is recommended and often applied when measuring personality traits (for an overview, see Boyle & Helmes, 2009). The questions stated during the interview sessions aimed at identifying particular characteristics, behavioral tendencies and personal experiences that would go along with the trait. Furthermore, they also asked about

hobbies, their environment during their childhood, social contacts and beliefs. Based on the information collected through the interviews and the subsequent studies in which they also measured their personality based on the Myers-Briggs Type Indicator (developed by Myers, 1962), E. N. Aron and Aron (1997) realized that although SPS might be related to introversion, the scale is measuring something else:

> When the scale was complete, we were surprised to see the wide range of items that correlated well with one another, from sensitivity to pain and startling easily to a complex inner life and conscientiousness. This result caused us to think further about the concept we were uncovering and to suspect it was about processing at a deep level rather than simply having keen senses and being easily overwhelmed by too much stimulation. (E. N. Aron, 2010, p. 235)

Based on these findings, E. N. Aron and Aron compiled a questionnaire including a total of 27 7-point Likert scale items. This scale has been applied in numerous studies throughout the years in order to identify people with the trait. Example items included in the scale are: “Are you easily overwhelmed by strong sensory input?”, “Are you made uncomfortable by loud noises?”, or “Do you get rattled when you have a lot to do in a short amount of time?”. In the Appendix (Appendix A), the original English questionnaire by Aron and Aron (1997) can be found. However, in addition to the original scale comprising 27 items, variations of the scale with less and more items can be found. Among them is one longer version with 39 items (Konrad & Herzberg, 2017), as well as a version with 38 items for children and adolesents (Pluess et al., 2018); both based on the original items. Gearhart and Bodie (2012), as another example, applied an 18-item version of the scale and subsequently ended up with a 10-item version of the scale due to revealed model fit, while Pluess and colleagues (2018) also developed a 12-item version for children and adolescents. A similar approach, but based on a German translation of the scale, was applied by T. Tillmann, El Matany, and Duttweiler (2018), who came up with a 10-item version for children and adolescents after analyzing psychometric properties of the original scale. Furthermore, as the international interest in conducting research on the trait increased, more and more translated versions appeared, including a Dutch version (Evers, Rasche, & Schabracq, 2008), a Chinese translation (Jagiellowicz et al., 2011), as well as Italian (Nocentini, Menesini, & Pluess, 2018), and Japanese (Kibe, Suzuki, & Hirano, 2018) versions, to just name a few examples (for an overview, see also Greven et al., 2018). German translations are found

as well, such as a version based on the original 27-item version by Blach (2016) or the one by Borries (2012), who further added four additional items to the questionnaire.

3.3.2. Psychometric properties of the scale.

In line with updating, and translations of the original scale by E. N. Aron and Aron (1997), numerous studies investigating its psychometric properties can be found in the literature. An overview of some example findings is offered in the following sections, separated based on the specific psychometric properties under investigation.

Cronbach's alpha, as a measure of internal consistency, of the original 27-item version ranges between .85 and .92 for studies applying the original English version and between .89 and .93 in studies using translated original versions (Gearhart, 2014; Sobocko & Zelenski, 2015). A 38-item version for children revealed a value of $\alpha = .92$, whereby the shorter 12-item version with children demonstrated reliabilities ranging between $\alpha = .71$ and $\alpha = .74$ (Pluess et al., 2018; Pluess & Boniwell, 2015). A similar result ($\alpha = .75$) is found in a 14-item version based on a German translation (T. Tillmann, 2016) and other versions of a translated short scale (e.g. Jagiellowicz et al., 2011). Based on suggestions by P. Kline (1999) and Cortina (1993), all reported internal consistencies can be interpreted as acceptable to good. Additionally, a correlation of .99 at two subsequent points in time (Acevedo et al., 2014) reveal evidence for good test-retest reliability. This was further supported by Pluess and colleagues (2018) with a correlation coefficient of .68 for the overall score and a result up to .78 for the subscales.

As a second property, various aspects of the test's validity have been analyzed and criticized throughout the years (e.g., Wyller et al., 2017). In particular, relationships and the differentiation from other personality traits, such as introversion and emotionality have been questioned, which will be the focus of an upcoming section (see chapter 3.5.). The first validity criterion, the content validity, can be seen as met. This is mainly due to the qualitative process of development, which has its starting point in the analyses of various existing established personality theories as well as the interviews that have been conducted with different people, ensuring the detailed analysis of various characteristics that are related to SPS. Furthermore, the wide range of situations and behavioral patterns the scale covers, supports this assumption as well.

As a second aspect the construct validity is the dimension mostly discussed in the scientific literature on SPS. It also is the most criticized aspect since it aims at differentiating different aspects and integrating the construct into the existing field of various personality theories and research. As already described above, SPS is assumed to be a trait that has already been implicitly analyzed in various personality theories and that might be the underlying mechanism for differences in people (e.g., E. N. Aron et al., 2012). However, Aron and other researchers conducting studies on SPS have empirically shown that, despite the hypothesized existing relationship with other personality constructs, the HSP scale is not measuring the exact same aspect as other personality scales (for more detailed information, see chapter 3.5.).

Support for acceptable convergent validity was revealed by a medium correlation (r = .64, p <. 05) with a scale measuring low screening abilities based on theory by Mehrabian (1976; E. N. Aron & Aron, 1997). Similarly, small significant correlations between SPS and activity of the behavioral inhibition system (BIS) (r = .32, p < .01 by Smolewska, McCabe, & Woody, 2006; r = .48, p < .01 by Sobocko & Zelenksi, 2015) as well as the Reward Responsiveness Scale measuring the activity of the behavioral activation system (BAS; r =.16, p <.01 by Smolewska et al., 2006; r = .25, p < .01 by Pluess et al., 2018) further empirically supported partial independence. The scale measuring BIS / BAS activities (Carver & White, 1994) is based on the theory by Gray (1981), one of the theories SPS is based on. Correlations with this scale were also realized based on the different factors in the trait. The study by Pluess and colleagues (2018), for example, found that the BAS was not significantly correlated with the facet Low sensory threshold (LST). While BIS and the facet Ease of excitation (EOE) revealed the highest correlation coeeficient (r = .49, p < .01), the strongest correlation with BAS was found with the facet Aesthetic sensitivity (AES; r = .50, p < .01).

Furthermore, in support of discriminant validity, correlations with social introversion have been analyzed. E. N. Aron and Aron (1997) were the first to reveal significant (p < .05) medium correlations between the HSP scale and a Social Introversion Scale developed by themselves (r = .32, .31 and .25 in three studies) and the Eysenck Personality Inventory (r = .27; Eysenck & Eysenck, 1968). The correlation between the HSP scale and the Extraversion / Surgency dimension of the Big Five Inventory (John, Donahue, & Kentle, 1992) revealed a correlation of .58 (p < .01). Furthermore, in one of their studies, they applied the Myers-Briggs Type Indicator (MBTI; Myers, 1962) based on a sample of 206 participants in order to measure

introversion-extraversion and the relationship to SPS based on a different instrument. Results revealed a small (r = .14), but non-significant correlation. This is of particular importance since the correlation between the developed introversion scale in the study and the MBTI scale was .32, with significant differences between correlations being significant (Z as an indicator for the difference in the two correlations; Z = 3.95, p < .001). This supports the assumption that SPS and introversion do not measure the same underlying construct. In fact, Jagiellowicz and colleagues (2011) further supported this assumption of independence in their study analyzing the unique contribution of SPS to brain activation which found that results did not change significantly when controlling for introversion. Morevoer, scores on the HSP scale and NEO-FFI extraversion scale have been found to demonstrate only a weak relationship (Costa & McCrae, 1992; Smolewska, McCabe, & Woody, 2006). For instance, Ahadi and Basharpoor (2010) found a small significant negative correlation (r = -.23) with only one of the suggested sub-factors, whereas Sobocko und Zelenski (2015), also found a small negative significant correlation with extraversion (r = -.22, p < .01) as well, using the Big Five Factor Inventory by John and Srivastava (1999). Similarly, a recent study (Lionetti et al., 2018) corroborated these results revealing a small and negative relationship (r = -0.24, p < .01) between SPS and items from an international personality item pool (Goldberg, 1999), previous findings were supported, revealing a small and negative significant (p < .01) correlation coefficient of -0.24. In line with these studies, Gerstenberg (2012) found significant negative correlations between two suggested sub-facets of SPS and extraversion (r_{EOE} = -.21, p < .05; r_{AES}= -.33, p < .01) applying a German version of the NEO PI-R (Costa & McCrae, 1992; German translation by Ostendorf & Angleitner, 2004). Picking up the study by Lionetti and colleagues (2018) again, this was further, at least partially, supported (r_{EOE} = -.36, p < .01; r_{AES}= .11, n.s.; r_{LST} = -.19, p < .01).

Similar results were found for the personality trait Openness to experience, which is not assumed to be significant related to SPS and further support the scale's discriminant validity. In line with this hypothesis, Sobocko and Zelenski (2015) did not find a significant relationship between the total HSP scale and the factor Openness to experience (r = .04), but a small significant correlation between Openness to experience and only one of the factors of SPS (r_{AES} = .26). This result was supported by a small correlation (r = .19, p < .01) between the total HSP scale and openness to experiences as measured in the NEO-FFI (Costa & McCrae, 1992; see Smolewska et al., 2006) and a small positive correlation with one of the sub-facets of the trait

(r_{AES} = .38, p < .01). Lionetti and colleagues (2018) also investigated this relationship, revealing a correlation coefficient of r = .01 (n.s.) for the whole HSP scale and values of r = -.14 for the two facets EOE and LST (ps < .05) as well as r = .37 for AES (p < .01). A third variable that has been tested with regard to SPS and which would lend support insofar as discriminant validity is the construct of neuroticism. Correlations between the HSP scale and measures of neuroticism revealed values of .45 (p < .01) for the whole scale (Smolewska et al., 2006), or between r = .20 and r = .61 for (Ahadi & Basharpoor, 2010) and between .38 and .58 (ps < .01) for all three factors of the scale (Gerstenberg, 2012). E. N. Aron and Aron (1997) also found medium correlations with neuroticism (r = .50, p < .01; r = .41, p < .05). Similarly, Lionetti and colleagues (2018) revealed coefficients of r = .56 (p < .01) for the total scale and neuroticism as well as scores between r = .15 (p < .05) and r = .58 (ps < .01) for the three different facets.

An additional aspect, which is of importance when analyzing the validity of the HSP scale, is the factorial structure behind the construct, which has been discussed since the first publication about the trait. In their first publication, E. N. Aron and Aron (1997) suggest a unidimensional structure, which they and other researchers empirically support repeatedly in subsequent studies (E. N. Aron et al., 2005; Gearhart & Bodie, 2012; Neal, Edelmann, & Glachan, 2002). Other researchers applied the unidimensionality assumption without investigating it further (Benham, 2006; Brindle, Moulding, Bakker, & Nedelijkovic, 2015; Hofmann & Bitran, 2007; Pluess & Boniwell, 2015). However, alternative factor structures have been suggested as well: Evans and Rothbart (2007), for example, suggest a two-factorial structure with the two dimensions temperamental negative affect and orienting sensitivity, which are assumed to be moderately correlated with each other (r = .25) based on 25 of the original 27 items of the scale (two items are defined as miscellaneous). After analyzing their own data based on a single factor solution and forcing the data into the model with three factors as suggested by Smolewska and colleagues (2006), they stated that the data fit their suggested two-factorial and the three-factorial model best. However, they decided to apply their originally suggested two-factor solution due to theoretical reasons. One reason for this decision was to compare the HSP scale to their temperamental theory (Evans & Rothbart, 2007). In their theory, they suggested different factors, two of which are negative affect, including a facet Sensory discomfort, and Orienting sensitivity, which included a factor perceptual sensitivity. This structure has been supported by two studies with school children based on a translated and shortened (14- and 10-item-) version of the scale, which is appropriate for use with children (Tillmann, 2016; Tillmann, El Matany & Bertrams, 2018). A third structure has been suggested by Smolewska

and colleagues (2006), who proposed three factors: Ease of excitation (EOE, 12 items), Aesthetic sensitivity (AES, 7 items) and Low sensory threshold (LST,6 items) on the basis of 25 items. With correlations of $r = .73$, $r = .45$, and $r = .40$, they are said to correlate medium to high with each other and are able to explain 40.50% of the variance (correlations in the study by Pluess and colleagues in 2018 revealed correlation coefficients of $r = .29$, $r = .54$, and $r = .18$, all of which were significant on an alpha-level of .01). Although Smolewska and colleagues (2006) also tested the unidimensional factorial structure and revealed evidence for a good model fit for the unidimensional version, the three-component structure fit the data of their study the best. However, based on the relatively strong correlations, they state that "the positive intercorrelations among these factors, however, are consistent with a general, higher-order construct of SPS" (p. 1276). Similar to the procedure by Evans and Rothbart (2007), Liss, Mailloux, and Erchull (2008) compared the two and the three-factorial structure based on their data. Due to the better fit, they supported the three-factorial model. This three-factor basic structure has been followed by various researchers (Ahadi & Basharpoor, 2010; Evers et al., 2008; Gerstenberg, 2012; Konrad & Herzberg, 2017; Liss, Timmel, Baxley, & Killingsworth, 2005; Pluess et al., 2018).

Recent developments with regard to the construct's facets suggest a bifactorial structure. In particular, Lionetti and colleagues (2018) recently reported that based on fit indices revealed by their confirmatory factor analysis, a bifactorial model, "which means that the HSP scale is made up of both a general sensitivity construct as well as three individual subscales" (p. 7), fit their data best, even better than the model with three factors.

These described findings on the structure of the trait have not revealed final and accepted insights into the different facets of the construct yet. Although the unidimensionality of the construct, which was originally suggested (E. N. Aron & Aron, 1997), has been criticized and could not be replicated (e.g., Konrad & Herzberg, 2017). However, in recent years, more and more studies focus on a 3-factor solution (e.g., Konrad & Herzberg, 2017; Pluess et al., 2018) and the newly suggested bifactorial model, which also includes the aforementioned three facets, suggesting a trend in this direction. Particularly, Lionetti and colleagues (2018) state that this way "the two contradictory views … are both simultaneously valid rather than mutually exclusive" (p. 8).

With regard to the possibility of the existence of different facets the construct represents, E. N. Aron and Aron (2013) write: "If there are different facets to an overall trait of sensitivity, this would not be surprising, given the wide range of item content. Indeed, we think there are at least the four we described in the previous main section" (p. 4). They continue

> however, the scale was not designed to tap facets having theoretical construct validity, and we are cautious about drawing strong conclusions from the factor analysis procedures because results have been inconsistent across samples and methods as to whether there are one or more factors. (p. 4)

Furthermore, they criticize the methods that were applied in order to analyze the factor structure due to different reasons: First, factor analyses might be based on the roughly 80% of the participants who cannot be allocated to the group of HSPs; secondly, different facets might represent "artifacts of gender differences" (E. N. Aron & Aron, p. 4); and third, due to the application of a self-report method, a bias might affect different facets due to social desirability and other issues.

3.3.3. Additional measurements.

In addition to the described questionnaire, a rating system for preschoolers has been developed (Lionetti, Aron, Aron, Klein, & Pluess, 2017). It offers a way to measure SPS based on observable behavior, making it less dependent on subjective evaluations. Particularly, it was found to capture sensitivity toward the parenting environment, which is found to also play an important role with regard to the respective outcomes in children. Furthermore, a questionnaire for parents about their children exists (Boterberg & Warreyn, 2016) that was found to measure the two facets, namely Overreaction to stimuli and Depth of processing. As it consists of a total of 23 items it measures a wider range of information than the recently applied self-report scale for children with 12 items (e.g., Pluess et al., 2018).

3.4. The Distribution In the Population: Identifying People with the Trait

As already stated above, SPS was originally assumed to have a genetic component. Furthermore, it is assumed to be found in between 10% and 35% of all people (E. N. Aron et al., 2012, p. 273). The fact that SPS "is distributed more like an approximately dichotomous category variable rather than as a continuum with a normal distribution" (E. N. Aron et al., 2012, p. 273) has not only been suggested theoretically, but also empirically supported (i.e., based on taxonomic analyses) supported in one study (Borries, 2012). In her analyses, Borries

found the existence of two distict subgroups, distinguishing between HSPs and non-HSPs, which were marked by qualitative differences. She did not only find that SPS is a taxon, but that 17.5% are HSPs and 82.5% not HSPs based on a sample of 898 participants. Although these relative numbers are in line with suggestions by Aron herself, who stated ranges from 10% to 35% (E. N. Aron et al., 2012, p. 273), or from 15% to 25% (E. N. Aron & Aron, 1997, p. 345), both generally based on conceptualizations by Kagan (1994), in her paper, Krönung (2015) could not replicate this finding in her study.

Based on the suggestion of SPS as a dichotomous trait, the question arose how to identify the HSP group. As an answer to that, E. N. Aron and colleagues (2012) suggested the following procedure:

> In practice, this means that we usually find a break point somewhere in our sample distributions and the 'curve' is flattened, rather than most individuals grouped around a single central mean. In our samples, typically between 10% and 35% fell into the highly sensitive category, depending on the sample – for example, psychology classes tend to attract more sensitive students than other classes. (p. 273)

As a consequence, this would, for example, mean that a person could be in the group of HSPs in the one sample, but not in the other sample, due to differences in the distribution and the scores on the HSP scale of the different participants. In a paper with tips on conducting research on SPS, E. N. Aron and Aron (2013) updated their first conceptualizations by considering the nature of the sample and identifying possibly special characteristics of the participants. They state that the two groups could include

> between 15% for HSPs and 85% for not HSPs, up to 30% for HSPs and 70% for not HSPs. In some cases you might see a visible break point in the distribution or you might decide more by the nature of the sample – psychology majors might be a bit higher in % HSPs, career military, a bit lower. (p. 2)

They further describe that one should "include at least 20% as HSPs in order not to miss them" (p. 2) as a general rule of thumb. By treating the SPS trait as a dichotomous rather than continuous, variable, as described by the original methods above, the pattern of results became clearer and more meaningful. In particular, E. N. Aron and Aron (2013) state that "treating SPS as a continuous variable means that most of your results will be based on the variance among the 80% or so of people who are not highly sensitive" (p. 2).

When looking through studies conducted using the HSP scale in order to measure SPS, it becomes clear that not all researchers followed those suggestions. Rather, a set of very mixed approaches exist: While in some studies the dichotomizing approach was followed (Jagiellowicz, 2012; Kjellgren, Lindahl, & Norlander, 2009), numerous other researchers treat the construct as a continuous variable (e.g. Brindle et al., 2005; Jagiellowicz et al., 2011; Neal et al., 2002). Furthermore, even among the studies that do analyze SPS as a dichotomous variable, approaches differ significantly, particularly with regard to the cut-off values and related percentages of participants in a sample applied. While Kjellgren and colleagues (2009), for example, applied a cut-off value of 50%, and Liss et al. (2005) a cut-off of 25%, Jagiellowicz (2012) assigned only the top 20% to the group of HSPs.

Most recently, the original assumption of SPS representing a dichotomous trait, was challenged. In Lionetti and colleagues' (2018) study the authors applied latent class analysis in order to extract the number of sensitivity groups that fit their data best. Results suggested the existence of three rather than two sensitivity groups, suggesting the opposite of the originally assumed distribution. Specifically, they found that around 40% of the population can be characterized as medium sensitive, while 30% reached particularly high and additional 30% specifically low scores on the HSP scale. Appealing to the metaphor of Orchids and Dandelions, the authors identified orchids A reflecting the minority of the population that is more affected by negative and positive environments (e.g., Boyce & Ellis, 2005), representing the Highly Sensitivity Group whereas those in the Low Sensitivity Group were called dandelions, and those with SPS scores between these two extremes were called tulips, a flower that represents the area in the middle. The metaphor spoke to the level of care needed for the respective flowers to flourish, and distinguished between respective group characteristics. Namely, the high sensitive group on average reached significantly lower scores on measures of extraversion and significantly higher mean scores on neuroticism and positive emotional reactivity (Lionetti et al., 2018).

These findings were further supported with one child sample and two adolescent samples, suggesting a similar distribution (Pluess et al., 2018). For all studies, exploratory cut-off scores were also analyzed using the respective distribution of the scores revealed on the HSP scale. The specific cut-off scores found are the following:

- in the sample with adults: 3.71 and 4.66 (based on a 7-point Likert scale; Lionetti et al., 2018);

- in the sample with children: 4.17 and 4.75 (based on a 7-point Likert scale; Pluess et al., 2018);
- in the sample with adolescents: 3.64 and 4.65 (based on a 7-point Likert scale; Pluess et al., 2018).

It can therefore be summarized that, although with the development of the HSP scale, researchers are given the possibility to measure the trait within and across people, there are still ambiguous and unclear definitions of how to answer the question of who is highly sensitive and who is not. However, recent developments are promising as they apply more advanced and diverse methods across relatively big and diverse samples, and come up with consistent results (e.g., Tillmann, Bertrams, & El Matany, 2019).

3.5. Sensory-Processing Sensitivity and other Personality Traits and Characteristics

Due to the fact that SPS is assumed to be a meta-trait (i.e., in a way that it has been touched by various existing theories already), and given the many different theories that build the theoretical foundation, SPS is often confused or even equated with other personality traits and characteristics. The following section therefore aims at differentiating SPS with other personality characteristics SPS is commonly compared to: introversion and neuroticism as two of the Big Five personality traits (e.g., McCrae & Costa, 2008), shyness and emotionality. The following sections describe those aspects and the relationship with SPS shortly.

3.5.1. (Social) introversion (Big Five).

Due to criticism with regard to the relationship between SPS and introversion, this is the personality trait that is most often investigated in addition to SPS. This is not surprising, given that some of the traits SPS is based on indeed called their characteristics Introversion (Eysenck, 1981; Jung, 1961). However, it has been statistically supported that introversion and SPS do not measure the same underlying trait. This was done by conducting correlations between the HSP scale and various measures of introversion, which, however, had a significant focus on the trait of introversion as defined in the model by McCrae and Costa (1990). Table 6 below offers an overview of some studies that investigated those relationships. It includes the reference of the study conducted, the measurement of introversion applied in the particular study as well as results revealed.

Table 6

Summary of Correlation Studies on the Relationship Between SPS and the Big Five Personality Trait Introversion

Reference	Measuring instrument applied	Correlation coefficient
E. N. Aron & Aron, 1997	Myers-Briggs Type Indicator (MBTI; Myers, 1962)	r_{total} = .14, n.s.
	Big Five Inventory (BFI; John, Danahue, & Kentle, 1992)	r_{total} = .12, n.s.
Smolewska et al., 2006	NEO-Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992)	r_{EOE} = -.09, n.s. r_{AES} = .00, n.s. r_{LST} = -.12, $p < .01$ r_{total} = -.09, n.s.
Ahadi & Basharpoor, 2010	NEO-Five Factor Inventory (NEO-FFI; Costa & McCrae, 1989)	r_{EOE}= -.23, sig.[a] r_{AES} = n.s. r_{LST} = n.s.
Jagiellowicz et al., 2011	NEO Personality Inventory-Revised (NEO-PI-R; Costa & McCrae, 1992)[b]	r = .16, n.s.
Gerstenberg, 2012	NEO Personality Inventory-revised (NEO PI-r; Ostendorf & Angleitner, 2004)[c]	r_{EOE} -.21, $p < .05$ r_{AES} = -.33, $p < .01$ r_{LST} = -.20, n.s.
Sobocko & Zelenski, 2015	Big Five Factor Inventory (BFFI; John & Srivastava, 1999)	r_{total} = -.22, $p < .01$ r_{EOE} = -.22, $p < .01$ r_{LST} = -.23, $p < .01$ r_{AES} = .01, n.s.
Lionetti et al., 2018	50 items from the international personality item pool (Goldberg, 1999)	r_{total} = -.24, $p < .01$ r_{EOE} = -.36, $p < .01$ r_{LST} = -.19, $p < .01$ r_{AES} = .11, n.s.
Pluess et al., 2018	Five Factor Model Rating Form (Mullins-Sweatt, Jamerson, Samuel, Olson, & Widiger, 2006)	r_{total} = -.18, $p < .01$ r_{EOE} = -.27, $p < .01$ r_{LST} = -.22, $p < .01$ r_{AES} = .20, $p < .01$

Note. Studies listed in the table represent a selection. All the scales above measure extraversion as the reverse extreme of introversion. r = correlation coefficient; n.s. = not significant; EOE = Ease of excitation; LST = Low sensory threshold; AES = Aesthetic sensitivity; total = correlation with mean score of the total HSP scale.

[a]No information which p-level was reached given in the paper; [b] Translated into Chinese and only a subset of four items applied with low values in Cronbach's alpha (α = .44); [c]German version applied.

These findings were further supported by a second statistical method. In various studies (e.g. E. N. Aron et al., 2012; Jagiellowicz et al., 2011), the authors considered this aspect by conducting analyses while at the same time controlling for the variable of introversion. The obtained results did not significantly differ from those of the original analysis when at the same time being controlled for introversion. Furthermore, only roughly 70% of HSPs are found to be introverted, while 30% indeed are defined as more extraverted (e.g., E. N. Aron & Aron, 1997)

A second method of comparison regarding differences and similarities of the SPS and (social) introversion are analyses of related characteristics and descriptions on a content-based level. When considering the descriptors used for introversion, and particularly the defintion of introversion in the Big Five Model as described by McCrae and Costa (1990), it becomes clear that the aspects covered by SPS and (social) introversion differ from each other.

In order to summarize those findings, it can be said that results are twofold: On the one hand, these findings do show that there is some shared variance or underlying trait that both of them measure, but, on the other hand, they also suggest that both traits statistically cannot represent the same trait. Therefore, SPS can be said to be "related to but not identical with social introversion" (E. N. Aron & Aron, 1997, p. 362). They describe the relationship between the two variables in the following way:

> Because social interactions are a major source of stimulation, social introversion is a logical strategy for reducing stimulation. Thus we would expect some correlation between measures of social introversion and sensitivity …. However, it is quite clear from these data that many introverts are not highly sensitive, their introversion presumably arising from early or repeated unhappy social experiences (or some other mechanism other than sensitivity). Likewise, many highly sensitive individuals are not introverts. …. Past research has to have been muddied by these very different subgroups. (p. 362)

3.5.2. Neuroticism / emotionality (Big Five).

With regard to the Big Five trait neuroticism, similar findings as those related to introversion can be found. Table 7 describes the studies that analyzed the relationship between the HSP scale and various measures of neuroticism.

Table 7

Summary of Correlation Studies Investigating the Relationship Between SPS and the Big Five Personality Trait Neuroticism

Reference	Measurement instrument applied	Correlation coefficient
E. N. Aron & Aron, 1997	Big Five Inventory (BFI; John, Danahue, & Kentle, 1992)	$r_{total} = .41$, $p < .05$
Smolewska et al., 2006	NEO-Five Factor Inventory (NEO-FFI) (Costa & McCrae, 1992)	$r_{EOE} = .48$, $p < .01$ $r_{AES} = .19$, $p < .01$ $r_{LST} = .31$, $p < .01$ $r_{total} = .45$, $p < .01$
Ahadi & Basharpoor, 2010	NEO-Five Factor Inventory (NEO-FFI) (Costa & McCrae, 1989)	r_{EOE} = r = 0.61, sig.[a] $r_{AES} = .22$, sig. [a] $r_{LST} = .20$, sig. [a]
Jagiellowicz et al., 2011	NEO Personality Inventory-Revised (NEO-PI-R; Costa & McCrae, 1992)[b, c]	$r = 0.10$, n.s.
Gerstenberg, 2012	NEO Personality Inventory-revised (NEO PI-r; Ostendorf & Angleitner, 2004)**	$r_{EOE} = .58$, $p < .01$ $r_{AES} = .38$, $p < .01$ $r_{LST} = .43$, $p < .01$
Sobocko & Zelenski, 2015	Big Five Factor Inventory (BFFI; John & Srivastava, 1999)	$r_{total} = .44$, $p < .01$ $r_{EOE} = .50$, $p < .01$ $r_{LST} = .27$, $p < .01$ $r_{AES} = .09$, n.s.
Lionetti et al., 2018	50 items from the international personality item pool (Goldberg, 1999)	$r_{total} = .56$, $p < .01$ $r_{EOE} = .58$, $p < .01$ $r_{LST} = .40$, $p < .01$ $r_{AES} = .15$, $p < .05$
Pluess et al., 2018	Five Factor Model Rating Form (Mullins-Sweatt, et al., 2006)	$r_{total} = .31$, $p < .01$ $r_{EOE} = .38$, $p < .01$ $r_{LST} = .22$, $p < .01$ $r_{AES} = -.00$, n.s.

Note. Studies listed in the table represent a selection. *r* = correlation coefficient; n.s. = not significant; EOE = Ease of excitation; LST = Low sensory threshold; AES = Aesthetic sensitivity; total = correlation with mean score of the total HSP scale.
[a] no information about the exact *p*-value reached given in the paper; [b]Translations applied in these studies (Chinese and German respectively); [c] Only a subset of four items was applied in the study and revealed relatively low scores on cronbach's alpha (i.e., $\alpha = .62$).

Similar to the method applied above, various researchers conducted studies while controlling for neuroticism as well (e.g. E. N. Aron et al., 2012; Jagiellowicz et al., 2011). As was already the case for introversion, the results did not differ from those that were found originally, when not controlling for neuroticism. Additionally, when comparing characteristics of SPS with those of neuroticism as described by McCrae and Costa (1990), it becomes clear that they differ significantly with regard to their content as well. It can therefore be summarized that SPS and neuroticism are related to each other, but do not represent the same underlying construct.

However, it cannot be disregarded that the correlation coefficients found with neuroticism (Table 7) reveal a higher effect than those found with introversion (Table 6). One explanation might be the general item wording, which is negatively skewed in many of them. Therefore, some of the items involve and trigger negative affect. As was already described above, HSPs are assumed to process information more deeply no matter whether they are positive or negative in nature. However, the scale, that is supposed to measure the trait as a whole, focuses significantly on negative stimuli and affect and less on positive affect, leading to the items being answered in a way that the results are more similar to those on scales measuring negative affect. This is an important aspect to consider when interpreting the results stated in the table above as well as other results revealed using this scale.

3.5.3. Sensory-processing sensitivity as a combination of (social) introversion and neuroticism.

It was additionally assumed that SPS might represent something like a combination of social introversion and neuroticism. As was the case above already, this question was also answered through controlling both variables as well as the interaction of these two variables while conducting different analyses. E. N. Aron and Aron (1997) applied this approach and stated in their paper as a result:

> In addition to finding that neither social introversion nor emotionality explained sensitivity, we also believed it was important to show that social introversion and emotionality together did not account for sensitivity. Indeed, in all six quantitative studies, the multiple correlation of sensitivity with these two variables was far from perfect, and correlations of other variables with sensitivity remained even after partialling out, simultaneously, both social introversion and emotionality (even when also including their interaction). (p. 363)

3.5.4. Shyness.

Finally, mainly through the behavioral tendency of HSPs to evaluate a situation before acting, it has been suggested that SPS might measure something similar to shyness. While there are numerous definitions of shyness, in this context it refers to the concept as suggested by E. N. Aron and colleagues (2005), which is described as “the fear of negative social evaluations that leads to discomfort and limitations on the desire for social contact” (p. 183). Various studies have revealed that the family environment plays an important role in the development of

shyness, in addition to the influence of some genetic factors that might play a role as well (e.g., Daniels & Plomin, 1985). Transferring this to the construct of SPS and considering the importance of the environment in this context (for more detailed information, see chaper 3.6.), it would be reasonable to assume that HSPs could develop shyness under circumstances of bad and unsupportive environmental experiences.

E. N. Aron and colleagues (2005) accepted this question and offered empirical support for the underlying assumption that SPS might only develop into shyness when a person experiences a negative childhood environment. Results of the four studies conducted, revealed the following:

> These four studies provide consistent and substantial initial support for a novel model of the relation of origins of adult shyness, such that the interaction of sensory-processing sensitivity and adverse childhood environment leads to negative affectivity, which in turn leads to shyness. (p. 195)

Despite this first evidence in support of their assumption, corroborated by the findings of Liss et al. (2005), the question about the specific relationships and effects is still unanswered and has to be investigated in further analyses.

3.6. Summary: The Interaction with the Environment in the Theory of Sensory-Processing Sensitivity

The findings described above indicate that the gene-environment interaction concept (e.g., Suomi, 2006) can be seen as supported by the theory of SPS as they suggest different behavioral, psychological and health-related outcomes based on the nature of the environment given different genetic profiles. While it is in line with the theory of SPS that high levels of stimulation might lead to overstimulation (i.e., in the negative sense) more easily in HSPs, the same is true for positive experiences that, given the proper instruction, pace and content, lead to increased positive outcomes as well.

E. N. Aron and Aron (1997) already revealed evidence for this suggestion in their first published study using cluster analyses based on measures of SPS, childhood experiences and negative affect. Results revealed two clusters of HSPs, one cluster was similar to the cluster with non-HSPs with regard to reported levels of experiences during childhood and negative affectivity, the second one, however, included HSPs who reported more negative experiences and more

negative affect. Those findings "suggested the possibility of a general pattern of an interaction between temperamental sensitivity and a history of many stressors that leads to chronic negative affect" (E. N. Aron et al., 2005, p. 182). In a second study, they were able to replicate and extend these results further. In particular, they aimed at investigating the assumption that "these two seemingly related constructs of sensitivity and shyness are separable but are linked through a relatively simple hypothesized model: An interaction between sensory-processing sensitivity and adverse childhood environment leads to negative affectivity, which in turn leads to shyness" (p. 181). By conducting and evaluating three questionnaire studies, they were able to support their assumption that the interaction of SPS and childhood experiences predicted negative affect as a trait in adults. In a fourth experimental study, they found that a combination of SPS and a negative experience reached by a manipulation during the experiment, was able to predict state negative affect.

Liss and colleagues (2005) supported these findings demonstrating the importance of environmental experiences. In their study, they found HSPs to report experiences with being over-protected by their parents. The authors assumed that "this may be a mutually interactive effect where a temperamental predisposition for sensitivity leads to particular parenting behaviors that enhance that sensitivity" (p. 1437). In particular, an interaction between parental care and SPS predicted depression, but not anxiety. However, the effect size was small and could not be found when treating SPS as a continuous variable. Interpretations of these findings assume that while over-protective parents might still be able to protect their children from negative environmental experiences, parents showing low parental care might not, which, in turn, is the hypothesized reason for the revealed affect. However, despite some limiting aspects mentioned above, the authors conclude that research on SPS "provides a useful conceptualization of how temperamental factors may interact with parental behaviors to produce psychological difficulties" (p. 1438).

Similarly, a third study (Meyer & Carver, 2000) investigated the relationships between negative experiences during childhood, SPS, pessimism, and aspects of the anxious-avoidant personality disorder. Results revealed that pessimism was related to anxious-avoidant behavior in HSPs, amon those who reported negative childhood experiences.

One final important aspect related to the role of the environment when describing SPS is the

cultural framework. When conducting research and interpreting data in line with the theory, it is important to keep in mind that cultures in the world can differ significantly from each other. All Western cultures, for example, have been described as relatively aggressive in nature. Inherited characteristics and traits that are not in line with those characteristics are not interpreted as desirable (E. N. Aron, 1997), as stated by the anthropologist Margaret Mead (described in E. N. Aron, 1997). Those cultural differences have been supported empirically as well in recent investigations. A study by C. Chen, Rubin, and Sun (1992), for example, revealed evidence for the fact that shy and sensitive school students are accepted by Chinese students, but that those characteristics are at the same time negatively related to acceptance when investigating results of a Canadian sample. Some other studies conducted throughout the years supported these findings (for an overview see X. Chen, Wang, & DeSouza, 2006). A. Aron et al. (2010) emphasize that there are "cultural differences in the social value accorded to highly sensitive individuals (Chen *et al.*, 1992) such that the trait may be relatively positively valued in Chinese cultural contexts but relatively negatively valued in North American cultural contexts" (p. 224).

In support of these culturally biased views are various research findings also suggesting that people perceive a relationship between characteristics of introverts and poor mental health (e.g., Zumbo & Taylor, 1993). As such, two resources of cultural bias can result in decreased self-confidence: Perceiving one's own characteristics as not being ideal in one's own country, and being confronted with stereotypes that go along with those characteristics. This, in turn, can cause an increase in negative feelings about the trait in question in particular countries. This has led to the conclusion that the cultural environment can be seen as one aspect of the environment that affects personal development processes of human beings, with and without SPS, and also peoples' perception of their own characteristics (E. N. Aron, 2010).

This effect of a person's cultural environment on his or her development might raise the question of whether particular characteristics might be found more often in certain cultures. With regard to the trait of SPS, one might expect that higher acceptance of SPS in Eastern countries might be responsible for the frequency of occurrence and development of the trait. With regard to the aspect of SPS of stimuli processing, for example, it has been found that Asian citizens pay more attention to their surroundings and contextual information, which might lead to the assumption that they might also recognize and process more subtle stimuli

(Nisbett, 2003; Nisbett & Masuda, 2003). This hypothesis, however, has been partially ruled out already. In a study by A. Aron and colleagues (2010), they investigated the information processing aspects of HSPs based on two small samples of ten East Asian and ten American participants using fMRI scanning techniques. Results revealed weaker cultural differences in HSPs, which the authors interpret as "suggestive evidence for a culture-by-temperament interaction in which an established cultural difference, that of taking context into account in perceptual judgments, is weaker for individuals high in SPS" (p. 224). While these findings point toward a (partial) independence of culture and SPS, cultural circumstances and conditions are particularly important in investigations of the trait, namely in relation to how different cultures differ in acceptance, and in turn influence a person's identification process.

It can therefore be said that empirical evidence suggests the importance of a person's environment (e.g., childhood experiences, parental support, cultural context), positive and negative in nature, in the individual development process, particularly with regard to people high on SPS.

3.7. Sensory-Processing Sensitivity and Negative Affect

Although it has been suggested that SPS is associated with positive and negative affect and is not conceptualized as a diagnosis or a disorder, the main focus in the literature has been psychopathology and negative consequences of the trait. For example, SPS has been found to significantly positively relate to agoraphobia (Hofmann & Bitran, 2007), mental health (e.g. Ahadi & Basharpoor, 2010), negative affect (e.g. Evers et al., 2008), anxiety (e.g., Liss et al., 2008; Meredith, Bailey, Strong, & Rappel, 2016), depression (e.g., Liss et al., 2005; Yano & Oishi, 2018), perceived stress (e.g., Bakker & Moulding, 2012; Benham, 2006), physical symptoms of ill-health (Benham, 2006) as well as lower levels of perceived happiness (Sobocko & Zelenski, 2015), to just name a few examples. A recent German study by Konrad and Herzberg (2017) investigated the correlations between SPS and different symptoms based on the German version of the Brief Symptom Inventory (original by Derogatis & Melisaratos, 1983; German version by Franke, 2017). While the general mean score on the total HSP scale revealed significant relationships with all symptoms with the highest observed effect sizes relating to anxiety ($r = .57$, $p < .001$) and hostility ($r = .54$, $p < .001$), results were slightly different when considering the specific three sub-facets of SPS. For example, the correlations between the different symptoms and EOE was found to be lower (i.e., between $r = .20$ and

r = .35) and at the same time higher comparing those to the results of the other two facets LST (i.e., correlation coefficients ranged between *r* = .06 and *r* = .24) and AES (i.e., range: *r* = -.01 – *r* = .15). This was particularly true when controlling for the respective remaining facets. In the work context, SPS has been found to be associated with more displeasure and need for recovery (Andresen, Goldmann, & Volodina, 2017; Evers et al., 2008).
Along with these statistically relevant relationships seems to go a confusion with regard to conceptual similarities and differences among researchers in this field. Evers and colleagues (2008), for example, defined SPS as "a symptom of work stress or burnout" (p. 189). Explanations of how exactly SPS might have an effect on specific outcomes are diverse and still display an important research gap in the field. The inability to accept negative feelings and emotion regulation strategies (Brindle et al., 2015) are two mediator variables suggested in the literature (e.g., Greven et al., 2018).

Finally, two additional studies investigated the trait specifically within clinical samples. The first study was published by Neal and colleagues (2002), who aimed at analyzing the effects of different variables of temperament (i.e., SPS, retrospective, self-reported inhibition) with different anxiety disorders and depression. Roughly three quarters of the sample consisted of members of self-help organizations for anxiety or depression. Using multiple regression analyses, results revealed that SPS could significantly predict anxiety, namely agoraphobia, general anxiety/panic, and social phobia, but could not predict depression. Furthermore, when taking SPS together with the dimension of social/school fears (i.e., one aspect of behavioral inhibition in this study), social phobia scores were significantly predicted. The authors assume this aspect to "be an aspect of aetiology that distinguishes this type of anxiety from the other two types of anxiety" (Neal et al., 2002, p. 369). Similarly, conducting partial correlation analyses, SPS was still found to be significantly positively related to different measures of anxiety with agoraphobia being more strongly associated with SPS than social phobia.

The second study by Hofmann and Bitran (2007) further investigated the relationship with anxiety by conducting a study with participants who "presented for diagnostic evaluation and possible treatment at the Center for Anxiety and Related Disorders at Boston University" (p. 945). Of these participants, around three quarters were diagnosed with a generalized subtype of anxiety, while the remaining part received a non-generalized anxiety diagnosis. Furthermore, it is important to note that in both groups, at least one third of participants "met criteria for at least

2 additional diagnoses" (p. 946). In the context of the study, it was defined as "a marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others" (APA, 1994, p. 416, as cited by Hofmann & Bitran, 2007, p. 944). Results suggested that SPS is significantly related to agoraphobia, but not social anxiety across participants with a related diagnosis. The authors explain this finding in line with possible comorbid disorders. Furthermore, SPS was found to be highly related to harm avoidance. It is important to note that both studies did not also include a non-clinical or control sample to compare their results to.

However, with reagard to the processes underlying the relationship between SPS and negative affect, explanatory models are still missing. Based on findings by Brindle and colleagues (2015), who "suggest that repeatedly experiencing aversive sensory states among HSPs impacts the general awareness and acceptance of internal states and the confidence that one can regulate them, in turn causing negative emotions" (p. 4), and findings in line with research on depression, Wyller et al. (2017) addressed this research gap and suggested a model based, which focuses on cognitive processes as underlying this association. Figure 8 below displays the model as suggested by Wyller and colleagues (2017).

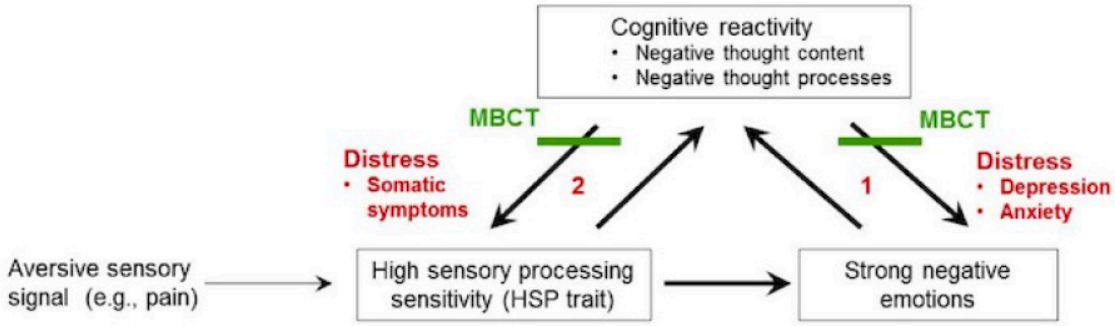

Figure 8. Model of the underlying mechanism behind the relationship between SPS and psychological distress as suggested by Wyller and colleagues (2017, p. 5).

The authors suggest that the deeper information processing (one of the basic chracteristics of the trait), will lead to enhanced negative emotions (i.e., relative to a person without the trait), which affects cognitive reactivity ", which in turn feeds back on the emotion, setting up a vicious circle" (Wyller et al., 2017, p. 5). An alternative process might include the direct effect of information processes on cognitive reactivity, also leading to negative cognitive processes and stronger emotions. Rather than seeing sensory information or negative emotions as individually responsible for the onset of psychological distress, they suggest the underlying

mechanism is rather the set of "secondary cognitive reactions" (p. 6) to represent the underlying mechanism. Furthermore, they suggest that "these secondary reactions might be what distinguishes healthy and unhealthy HSPs" (p. 6), an important facet of the model relevant to the present study. Consequently, it is assumed that "amplified sensory processing is enough to activate cognitive reactivity, independent of mood" (p. 7). Furthermore, they suggest the model to be transdiagnostic, which makes it independent of specific diagnoses. Finally, as a therapeutic intervention for HSPs with psychological distress they suggest Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams, & Tesdale, 2013) as it addresses cognitive processes.

Summarizing these findings, what is clear is that they seem to follow the line of reasoning as suggested by the diathesis-stress model (e.g., Monroe & Simons, 1991; see chapter 4.3.1. for more information). SPS seems to be interpreted as some kind of vulnerability factor that, given some conditions of stress, is responsible for the development of dysfunctional behavior and psychological, ill-health-related consequences.

However, within the last few years, this line of research has been criticized as being "biased towards psychopathology" (Pluess, 2015, p. 139), and various theories focusing more on positive outcomes have been developed, one of which is the theory of SPS. Although the studies focusing on positive outcomes are still outnumbered by those investigating SPS and negative affect, they do exist: In the study by Lionetti and colleagues (2018), HSPs were found to show an increase in positive affect subsequent to being induced positive mood induction. Similarly, when being given positive stimuli, the major reward centers in the brain have been found to be activated more strongly (Acevedo et al., 2014). Studies with children have also found elevated social competence when parents applied a positive parenting style (Slagt, Dubas, van Aken, Ellis, & Deković, 2017), and a higher decrease in depression scores when participating in an intervention in HSPs (Pluess & Boniwell, 2015). In particular, they investigated the effects of a school-based resilience prevention program (SPARK Resilience Program by Boniwell & Ryan, 2009) on girls with high or low levels of SPS. They found that while girls low on SPS did not significantly differ from the control group with no training, girls with higher levels of SPS revealed a progressive decline in depression score in a 12-months-follow-up assessment. Authors of the study interpreted the findings as

> suggesting that depression scores of the high SPS group declined progressively over time. Given that SPS is characterized not only by high sensitivity to environmental influences but also deeper processing of such influences (E. N. Aron & Aron, 1997) one possible reason why girls scoring high on SPS benefitted more from the intervention over time-and continued to do so even many months after the intervention ended-is that they processed the content of the intervention more deeply which may have led to better internalization and, consequently, continued application of the acquired cognitive-behavioral coping strategies. (Pluess & Boniwell, 2015, p. 44)

These findings were recently replicated using a large randomized control study (Nocentini et al., 2018). The intervention was found to decrease victimization and bullying. When also considering the SPS scores of participants, an effect was only found in children high on SPS.

3.8. Sensory-Processing Sensitivity in the (Teaching) Workplace

Research on SPS in the work place is still rare and constitutes a huge research gap. The few studies that have been published on the topic did not investigate the teaching work place with only one exception. Those not specifically related to teaching can be summarized in three categories with one describing performance-related, the second category including health- and stress-related aspects, and a third one describing the role of HSPs in organizations.

While the two studies on reaction times in response to changes of stimuli in a visual detection task revealed contrary findings (Gerstenberg, 2012; Jagiellowicz et al., 2011), Gernsteberg (2012) found that HSPs performed better in this specific task. Furthermore, SPS has been found to be positively related to creativity (Bridges & Schendan, 2018a, 2018b).

In comparison, more studies on the effect of SPS on stress and well-being have been conducted: One study by Maher and von Hippel (2005), was done in an open-plan office and aimed at investigating the effects of stimulus screening abilities on different work-related variables. As a basis of their study, they suggested that stimulus screening abilities and the possibility of selective attention are important factors when it comes to performance in the work place. In general, results revealed that

> in particular, although the relationship among these factors was varied, both poor inhibitory ability and stimulus screening consistently led to lower levels of employee satisfaction. The hypothesized interactions, however, were not evident for performance,

> suggesting that the interaction of these variables primarily promotes an affective rather than behavioral response. (p. 226)

A second example is the study by Evers and colleagues (2008), in which the role of SPS in the perception of the work environment and related stressors was investigated. Results suggested significant positive relationships with work stress, work displeasure and the participants' need for recovery, which stayed significant, although with a decreased effect size, when partialling out negative affect. Based on these findings they interpret SPS as a "burnout symptom" (p. 197) and point out that it is associated with the second rather than the first step of the stress process (see also Schabracq & Cooper, 2003).

The third and final category with regard to SPS in the work place represents the role of HSPs in organizations: Firstly, Daniel Panetta (2017) analyzed the effect of the trait on leadership attitudes and practices in his master's thesis. By interviewing a total of 17 leaders (nine of which he defines as being highly sensitive), he found various differences between HSPs and non-HSPs. In particular, he found that leaders, who are HSPs, focus on openness and team spirit and aim at fostering social competencies and empathy. In comparison, non-HSPs follow a more dictatorial and directive understanding of leadership. Another significant difference was the confrontation with their own position. While HSPs prefer to avoid spontaneous confrontation, non-HSPs prefer to find solutions spontaneously and immediately by facing the particular aspect. Panetta summarizes his findings in a way that particularly for HSPs, the mood of the situation, the own mood as well as the danger that might result based on a particular decision might represent the leadership style for people high on SPS. However, it is important to include that in the discussion part of his work, Panetta also described the difficulty in generalizing the findings beyond the specific sample and with regard to particular leadship styles.

Finally, Patrice Wyrsch (2016) aimed at revealing more insight about the strength and weaknesses as well as possible roles HSPs could have in an organization. Furthermore, he investigated what would help HSPs being more recognized in companies by interviewing ten experts in the field of SPS from Germany, Austria and Switzerland. Most of the experts in the study worked as coaches and counselors for HSPs, some even wrote books on the trait. With regard to strengths of HSPs in the work place, interviewees named creativity, intuition, problem-solving skills, holistic thinking and sense of responsibility to just name a few. Experts described weaknesses are seen in quicker overstimulation and emotionality, as well as

hesitation, and a critical attitude. Based on these characteristics, the questioned experts suggest HSPs to take roles that are related to advising and counseling, leadership as well as those that are related to quality-dependent tasks. In contrast, rough environment, quantity-dependent tasks as well as duties that require one to be at the front line are assessed as not suitable for HSPs. As an answer to the author's question about what companies could do to support HSPs, experts stated various aspects, among which were awareness of the trait, openness and transparency, a positive work climate, autonomy and the possibility of withdrawal. Similar to E. N. Aron and colleagues (e.g., 2012), who already pointed out the importance of environmental factors for the well-being and the development of people with the trait, Wyrsch further emphasized HSPs' dependency on the work environment. Similar to conceptualizations by Boyce and Ellis (2005), who called children more reactive to the environment orchid children, Wyrsch (2016) defined HSPs in the work place "orchid workers" (p. 70).

With regard to SPS in the teaching profession as the main focus of the present study, not much research has been conducted so far. One exception is the dissertation by Julie Stefan Lindsay (2017), who investigated the relationships between SPS, self-efficacy, stress levels and risk of burnout based on a sample of teachers from urban public schools. While this first goal of the study was realized with a survey study, she subsequently conducted interviews with teachers, who were found to have high levels of SPS. Using journal method and the aforementioned interviews she investigated the different characteristics of HSPs that are relevant in the school context, the sources of stress and coping strategies. Findings revealed a statistically significant relationship between SPS and the burnout sub-scale[4] Emotional exhaustion. On the other hand, not association with self-efficacy was found. Applying logistic regression SPS was only a significant predictor of burnout when no other predictors were considered. Furthermore, this relationship was found to be mediated by teachers' stress. While this first part, including the quantitative study, mainly replicated already existing findings, the second qualitative part of the study revealed findings that are new and of relevance in the present study. Stefan Lindsay (2017) found that the majority of the seven interview partners were reflected, conscious, empathic, emotionally reactive, were able to notice other people's moods, felt overstimulated relatively often in their work place. They further named "competing time demands and colleagues as their top sources of stress, which compromised their physical and emotional

[4]In order to accentuate sub-scales of measurements applied in this study, they are capitaliced. If a sub-scale name consists of more than one word, only the first word is capitaliced. This is also applied to factors and clusters.

energy" (Stefan Lindsay, 2017, p. 67). Additionally, the strategies reported by the participants were "routine coping strategies [were] approaches to the work that were used daily both inside and outside the classroom to effectively manage the workload" (p. 83), including "time management, preparation, recuperation, and flexibility"
(p. 83) and "systematic strategies", defined as "approaches that teachers had sustained over time and that helped them reestablish their commitment to the profession" (p. 83) and consisting of "commitment to their students, engaging in reflective practice, and having positive relationships at school" (p. 88). Finally, she provided a definition of SPS at the end of each interview, which led all participants to understand themselves better.

Despite the present research gap, but due to the characteristics that go along with SPS and which play an important role for teaching, it is assumed to be a career path HSPs would choose and is therefore of interest. Furthermore, the specific characteristics of the profession make an analysis even more interesting and necessary, given that they might not be compliant with their need.

3.9. Sensory-Processing Sensitivity as one Part of the General Theory of Environmental Sensitivity

In addition to the theory of SPS, several other concepts on inter-individual differences with regard to people's sensitivity have been developed throughout the last few decades. In particular, these are the theory of differential susceptibility (Belsky, 2013; Belsky & Pluess, 2009; see chapter 3.9.1.) and biological sensitivity to context (Boyce & Ellis, 2005; see chapter 3.9.2.). Contrary to the original scientific assumption regarding the existence of certain risk factors (i.e., as suggested by the diathesis-stress model; e.g., Monroe & Simons, 1991) all these more recently developed theories have in common that they consider both, adverse and positive experiences. One additional theory, called vantage sensitivity (Pluess & Belsky, 2013; see chapter 3.9.3.), only focuses on the effects of positive experiences. Because it represents the contradiction of the diathesis-stress model and plays an important role for the concept of SPS as well, it also plays a role in this study.

Although all these theories make their unique theoretical contributions toward the development of the theory of sensitivity, and were developed vastly independently of one another, they all share the basic assumption that people differ in regard to their responsivity to stimuli in the

environment and have been summarized in the meta-theory of environmental sensitivty (Pluess, 2015; chapter 3.9.4.).

The upcoming paragraph includes a short description of all aforementioned theory in order to offer a comprehensive overview of recent developments in the area of person-environment interaction from different research fields.

3.9.1. Theory of differential susceptibility.

The theory of differential susceptibility (e.g., Belsky, 1997, 2005, 2013; Belsky, Bakermans-Kranenburg, & Van Ijzendoorn, 2007) is generally based on criticism of two main aspects of the diathesis-stress framework (e.g., Monroe & Simons, 1991):

- First, they critically point out that the observations made in support of this model were only made in situations of adversity. Consequently, research applying the model did not focus on possible outcomes subsequent to positive environmental experiences (Belsky & Pluess, 2009, 2013).
- Second, they describe that an evolutionary perspective would not be able to explain the development of dysfunctional behavior as a consequence of a combination of stressful life events and particular personal characteristics. In particular, they describe existing evidence supporting the assumption that in circumstances of negative experiences, individuals would be more likely to adapt to the environment rather than developing dysfunctional behavior (for a review, see Belsky & Pluess, 2013). In line with this way of thinking, they argue that

> the negative consequences of a discrepancy or mismatch between anticipated and eventual environment would affect predominately those individuals who are more susceptible to environmental influences (i.e., those with a higher degree of developmental plasticity), but not those generally less susceptible. This could be particularly beneficial if such interindividual variation in developmental plasticity occurred within families, as siblings varying in susceptibility would essentially provide ‘insurance’ for each other—and their parents vis-a`-vis their inclusive fitness prospects (Belsky, 2005). (Pluess & Belsky, 2013, p. 902)

Considering these two critical aspects and developing a new model, Jay Belsky and his research group suggest the existence of a more general susceptibility for both positive and negative influences. Particularly, they assume that a certain percentage of people exists who might be

more sensitive to environmental aspects "for better *and* for worse" (Belsky et al., 2007, p. 300). In comparison to those who are more susceptible to environmental influences, the people who were described as more resilient in the framework of diathesis-stress are interpreted as unresponsive to environmental influences, which can be either supportive or unsupportive in nature.

Furthermore, people who are more susceptible to the environment based on the framework of differential susceptibility, show enhanced functioning in supportive environments that would not be found when explaining them as being resilient to adversity. In addition, it is important to note at this point that, in this theory, supportive environments are more than solely the absence of adversity, and positive functioning includes more than just absence of dysuncional behavior and cognition.

Figure 9 below describes a model depicting the differences between diathesis-stress model (represented by the solid black line) and the differential susceptibility framework (represented by the solid grey and doted gray lines) graphically. The main differences between the two models are the positive behavioral and developmental outcomes within a positive environment, which are not included in the diathesis-stress framework due to the main focus of this framework being on adversity and children's reaction toward adverse environmental experiences.

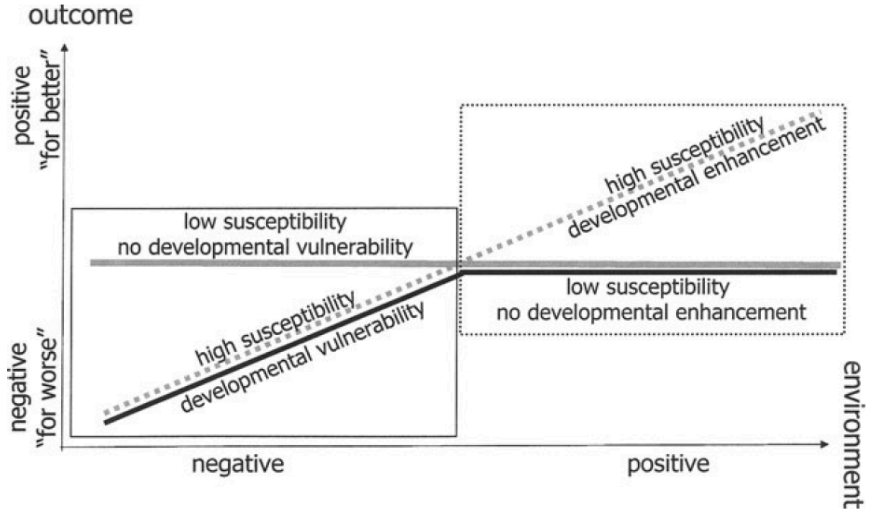

*Figure 9. D*ifferences between the diathesis-stress model and the differential susceptibility framework (from: Ellis, Boyce, Belsky, Bakermans-Kranenburg, & van Ijzendoorn, 2011, p. 9).

Although there are studies supporting the existence of the aforementioned individual differences based on genetic influences (e.g., Belsky & Pluess, 2013; Caspi et al., 2003; Pluess,

Belsky, Way, & Taylor, 2010; van Ijzendoorn, Belsky, & Bakermans-Kranenburg, 2012), this theory was mainly developed based on reviews of literature describing various studies with children and the effect of rearing experiences, including studies that were observational, correlational, longitudinal, as well as experimental in nature (e.g., Belsky, 2005; van Ijzendoorn et al., 2012).

Due to the theory's relatively new occurrence in the field, there are still some open questions that have to be answered (for a more detailed overview, see Belsky & Pluess, 2013). These include, but are not limited to, the question of whether susceptibility is domain specific or general, whether it is a continuous or discrete variable, and the question of whether there are some particularly sensitive phases in a child's life, such as those during which biological systems are developing.

3.9.2. Biological sensitivity to context theory.

Although a second theory on the development of children facing both positive and negative environmental conditions, called theory on biological sensitivity to context, has been developed independently of the theory on differential susceptibility (e.g., Belsky & Pluess, 2013), both theories show significant overlaps with regard to certain aspects and the overarching scope (for a comparison and integration of both theories, see also Ellis et al., 2011).

As can be expected based on the name, the theory on biological sensitivity to context focuses on biological processes and their interaction with environmental circumstances in children's adaption and development (e.g., Boyce & Ellis, 2005). Those include both biological and physiological measures, such as immune or autonomic reactivity. In particular, this line of research began by trying to answer the underlying question of whether children differ in their plasticity, specifically with regard to social and rearing experiences. This question was asked in response to findings showing particularly high rates of children with psychological and physical problems among a subset of children raised in non-supportive environment. In comparison, children with the least problematic behavior and more social skills were found to be those with experiences of supportive environments (for a review, see Ellis & Boyce, 2011).

Research conducted within the framework of biological sensitivity focuses on physiological reactivity as a plasticity factor, which is regulated through environmental experiences.

Furthermore, and similar to the framework of Differental Susceptibility, it analyzes the role of this reactivity on the development of adaptive functioning (e.g., Boyce et al., 1995; Ellis & Boyce, 2011). As a result, it was found that reactivity to stress moderated the relationship between adversity and adaptive functioning in a way that high reactivity and more adversity lead to less positive functioning. This was found to be true in circumstances of low levels of adversity, leading children to adapt even better given high reactivity levels (e.g., Masten & Obradovic, 2006; Obradovic, Bush, Stamperdahl, Adler, & Boyce, 2010).

3.9.3. Theory of vantage sensitivity.

Based on the concept of differential susceptibility (e.g., Belsky, 1997, 2005), vantage sensitivity is one of the first theories particularly focusing on positive environmental experiences as a function of tempermental characteristics (Pluess, 2017; Pluess & Belsky, 2015). Due its link to solely positive experiences, it has its roots in the movement of positive psychology in the recent years (Seligman & Csikszentmihalyi, 2000; for more information on this research field, see chapter 4.2.6.). The expression vantage sensitivity originates from Manuck (2011), with *vantage* being a short form of advantage, describing positive experiences in particular. Due to the focus of this theory, Pluess and Belsky (2013) adopted the term and applied it to their own theoretical framework.

The underlying premise of the theory can be described in the following way: “In summary, *vantage-sensitivity factors* increase *vantage sensitivity* to the *beneficial effects* of *positive experiences and exposures*, whereas *vantage-resistance factors* diminish or even completely eliminate *positive response* to the same supportive conditions” (Pluess, & Belsky, 2013, p. 903). In line with this theory, positive experiences can result in various effects. To just name two examples, these can be “security of attachment derived from sensitive parenting, academic achievement resulting from high-quality child care” (Pluess & Belsky, 2013, p. 903).

In summary, Pluess and Belsky (2013) describe four main characteristics as being essential and unique to their theory (see also Figure 10 for a graphical summary). Due to the fact that it is based on the framwork of differential susceptibility, which in turn has its roots in the diathesis-stress model (e.g., Monroe & Simmons, 1991), the authors simultaneously include the respective counterparts found in the diathesis-stress framework. The resulting aspects are the following:

- Vantage sensitivity represents a more general characteristic responsible for the fact that some people benefit from environments which promote well-being and competence.
- The counterpart in the diathesis-stress framework represents the term vulnerability as the tendency to be particularly affected by adverse environments.
- It represents a function including vantage sensitivity factors. In the diathesis-stress framework, risk factors are assumed to increase an individual's vulnerability to negative affect.
- Vantage resistance in line with this theory means the absence of benefit from positive environments. However, in the diathesis-stress theory, resilience is characterized as a lack of negative effects of negative environmental experiences.

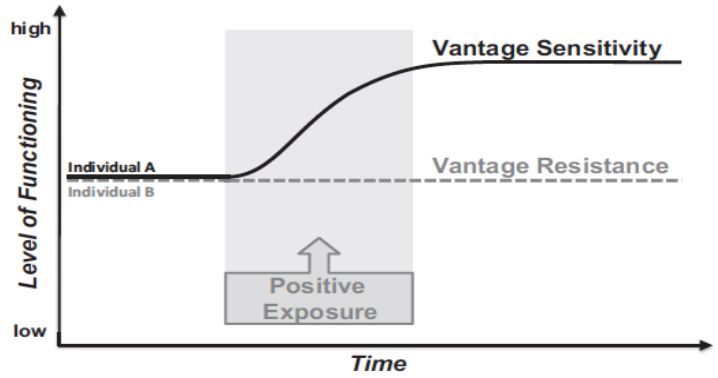

Figure 10. Graphical depiction of the vantage sensitivity framework (from: Pluess & Belsky, 2013, p. 904).

However, although partial evidence supporting the model was found, there are still some open questions that have to be answered in the future, similar to questions that remain open concerting the differential susceptibility framework. Additionally, and also in a similar way, experiments that would be able to answer those questions face the same ethical difficulties.
Some of the main unanswered questions include the question of whether vantage sensitivity is a more general phenomenon and whether it is inherited or can be developed throughout one's lifespan.

The two studies in support of the concept of vantage sensitivity investigated the effects of a school-based prevention program on depression (Pluess & Boniwell, 2015) as well as victimization and bullying (Nocentini et al., 2018). As an operationalization of sensitivity to the environment, the authors applied the HSP scale that was developed based on the theory of SPS (E. N. Aron & Aron, 1997). Results showed that SPS acted as a significant predictor of

levels of depression following the treatment. In particular, the training was found to be effective mainly for children scoring high on SPS and less effective for children with lower scores on the measurement of SPS (Pluess & Boniwell, 2015).

3.9.4. Theory of environmental sensitivity.

Environmental sensitivity represents an overarching meta-theory on individual differences with regard to people's sensitivity to context and contextual information. It consists of the four theories described above (i.e., sensory-processing sensitivity, differential susceptibility, biological sensitivity to context, and vantage sensitivity) and offers a new perspective on the research field of sensitivity as well as practical implications. As was already described in the context of SPS, it is assumed that inheriting the trait would only be beneficial if it is only existent in a minority of people and rather a disadvantage if it was found in a majority of people (see Greven et al., 2018). Based on recent studies (e.g., Lionetti et al., 2018; Pluess et al., 2018), it is assumed to follow a 30/40/30 distribution with a minority of people found in each of the two extremes groups (i.e., high and low sensitive). As part of his description of his theory, Pluess (2015) particularly focuses on the differentiation of the terms sensitivity and responsivity, which he realized in the following way:

> Whereas *sensitivity* refers to aspects of perception and internal processing of external influences (i.e., the input), *responsivity* refers to the resulting behavioral consequences (i.e., the ouput). Although differences in environmental sensitivity are largely responsible for the manifestation of differences in responsivity …, sensitivity does not equate with responsitivity. Given that behavioral repsonses are generally influenced by many factors, depending on the specific circumstances, heightened sensitivity may not always be associated with the same behavioral response. For example, while a highly sensitive child may behave in a more introverted and shy manner in a novel and unfamiliar social environment, the same child may behave like less sensitive children in a well-known and familiar setting. (Pluess, 2015, p. 139)

Figure 11 below depicts a graphical depiction of the relationships of the four theories.

In particular, while differential susceptibility provides an approach toward the mechanism of the trait, which is applied by the theory of sensory-processing sensitivity and biological sensitivity to context, the additional unique contribution towards this research field of the theory

of SPS is the HSP scale as a tool to be able to measure this characteristic in people. Since its development it has been applied across theoretical frameworks.

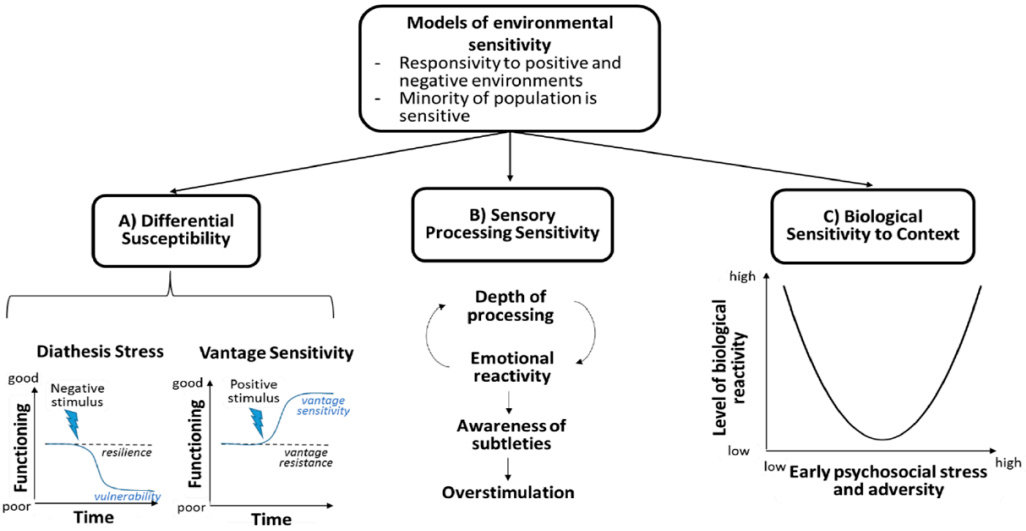

Figure 11. Graphical depiction of all four theories summarized in the meta-theoretical framework of Environmental Sensitivit (from: Greven et al., 2018, p. 71).

3.10. Criticisms of the Trait

Since the first study was published on SPS in 1997, the interest in conducting research on the trait has steadily increased. In addition to Aron and her research group, other researchers around the world have conducted studies using the HSP scale as well. This is not just true for the theory of SPS, but also the remaining theories on individual differences regarding sensitivity toward stimuli that have been developed in recent years. However, as the focus of the present study is the framework of SPS, the focus of the upcoming chapter will touch on criticisms of the SPS construct. As is the case with every newly established construct, critical voices in response to this approach can be noted in the scientific and popular-scientific literature as well. Main critiques have concernced the validity of the construct, item selection, and the lack of consensus regarding use of cut-off values, but also include conceptualizations of SPS as being (partially) equal to other psychological constructs and theories. The following paragraph will therefore summarize all groups of critical aspects that have been raised in the literature.

The first important question that has been raised repeatedly is that of whether the trait "is best viewed as normally distributed or as a dichotomous trait" (Benham, 2006, p. 1438). Although Aron herself as well as her research group in various papers repeatedly state that SPS is best seen as a dichotomous variable (e.g. E. N. Aron & Aron, 1997; E. N. Aron et al., 2005) and

empirical support has been found for this assumption (Borries, 2012), this finding could not be replicated in a second study applying the same methodological approach (Krönung, 2015) and has thus been recently challenged by Michael Pluess and colleagues, who suggest that the population is differentiable into three rather than two sensitivity groups (e.g., Lionetti et al., 2018; Pluess et al., 2018). This suggestion is consistent with the group of findings that yield normal distributions of participant scores on the HSP scale (e.g., Benham, 2006; Booth, Standage, & Fox, 2015; Hofmann & Bitran, 2007). This is further supported through the assumption by Haslam, Holland, and Kuppens (2012), who suggested that despite some exceptions, most variables that aim at measuring personality constructs are in fact dimensional rather than categorical.

Highly related to this question is the second aspect often addressed: The question about a particular cut-off point or value in order to be able to identify people with the trait reliably. As already described in more detail above, different studies do not only conduct their studies based on different theoretical beliefs about the trait (i.e., SPS being a continuous vs. a dichotomous variable), but also – even in the case of interpreting and treating SPS as a dichotomous variable – apply different cut-off values, leading to significantly differing percentages of a particular sample in a study being assigned to the group of HSPs. A closer look at such studies provides insight about the origin of this issue, namely arising out of the following two circumstances: On the one hand, the suggested percentage of people being HSPs varies among theoretical descriptions by Aron and colleagues (e.g. E. N. Aron & Aron, 1997, 2013; E. N. Aron et al., 2012), as well as empirical observations (e.g. E. N. Aron & Aron, 1997; Borries, 2012), and has thus not yet led to a distinct and accepted percentage across the scientific literature . On the other hand, the way to detect the possible cut-off (as suggested by E. N. Aron & Aron, 2013, for example) using the point at which "the 'curve' is flattened" (see E. N. Aron et al., 2012, p. 273) cannot be applied to all samples. Benham (2006), for example, in his study stated that they "were unable to demonstrate the same natural split around the top 10-30%" (p. 1438) and, consequently, interpreted SPS as a continuous variable in his study. Although a first step toward the answer to this question has been made recently by Michael Pluess and his colleagues, who suggested differential cut-off scores for a child, an adolescent and adult samples (e.g., Lionetti et al., 2018; Pluess et al., 2018), these findings still need to be replicated across cultures, samples and age groups. This is particularly important given that most studies on SPS are aimed toward a unique sample that are not necessarily expected to generalize to a borader population.

A third set of criticism that have been mentioned in the literature concern the HSP scale and its respective psychometric properties can be mentioned. In particular, the item selection in general (e.g. Evans & Rothbart, 2008; Meißner, 2015) as well as the dimensionality of the scale have been questioned (e.g. Smolewska et al., 2006) and subsequently adjusted, resulting in the use of alternate versions of the original scale by E. N. Aron and Aron (1997) have been applied (e.g. Ahadi & Basharpoor, 2010; Evers et al., 2008; Konrad & Herzberg, 2017). Similarly, the negative bias in the wording of the items has been raised as a potential methodological concern. Given the assumption that HSPs process positive and negative environmental stimuli more deeply, it is important to also reflect these two sides in the questionnaire used to measure the construct. It would therefore be important that future studies further optimize the scale by including this aforementioned positive perspective and by also including some aspects that have been suggested to be important in the theory on the trait but have not been included in items. Examples for characteristics that are still missing in the scale would be behavioral aspects, such as pausing to check, as well as the deeper processing of information (see also Greven et al., 2018 for a more detailed description).

The fourth critical aspect, which is most salient for the present study, is the relationship to negative psychological outcomes and related questions regarding discriminational aspects, and the public discussion that is often uninformed about scientific developments. While scientific research aims at approaching SPS based on a theoretical and empirical foundation, many books and articles that are published by people who are not working in the scientific field or those working in a field different than that of personality psychology tend to describe only partially what has been discovered or describe aspects, such as a possible diagnosis for HSPs (see for example Meißner, 2015) that have never been described in the empirical literature. Rather, Aron and her colleagues repeatedly state that SPS and related characteristics should not be seen as a weakness or an issue of psychological ill-health, which require no need for a therapeutic or medical diagnosis (e.g. E. N. Aron, 1997; E. N. Aron & Aron, 1997).

German physician and psychiatrist Andreas Meißner (2015) was the first to openly criticize the construct. In his article “Hochsensible Persönlichkeiten – ein wohl überflüssiges Störungskonzept” (“Highly Sensitive Personalities – a possibly needless dysfunctional concept”), he particularly criticizes the lack of empirical supportive findings about the concept, and the fact that it is a “social problem” (p. 17), which was also the case for burnout, and

concludes that he does not see a need for a new diagnosis. Furthermore, he suggests that affected people want to achieve some kind of protection without being labeled sick.
All these aspects mentioned above support the fact that there are a number of challenges and critical aspects that have to be taken into account when conducting research on the trait. Furthermore, this leads to the impression that there is no agreement on the nature of this trait in the scientific field yet. This, however, this does not capture the whole truth. The following section therefore aims at pointing out the reasons why investigating SPS further is not only important, but can and should address directly a number of the criticisms mentioned above.

4. Stress: Results of an Unsuccessful Interaction between a Person and the Environment

The upcoming paragraph aims at defining and describing important processes related to stress and mental ill-health. This is realized under the umbrella of the interaction of the two entities, a person and the environment, and, as was already the case with the theories above, based on a psychological point of view, which represents only one of many alternative approaches, such as under a cultural perspective (e.g., Genkova, Ringeisen, & Leong, 2013) or the biological point of view, focusing for example on allostatic load (e.g., Lupien et al., 2006).

Following this psychological framework, the theoretical background of the person-environment fit theory (chapter 4.1.) as well as basic terms related to stress (chapter 4.2.) are introduced. These introductory sections will then lead to the description of three important models describing the onset of stress effects (chapter 4.3.). Within the graphical depiction, those focus on the center (i.e., as was the case in previous chapters, the respective aspects are colored in orange in Figure 12 below).

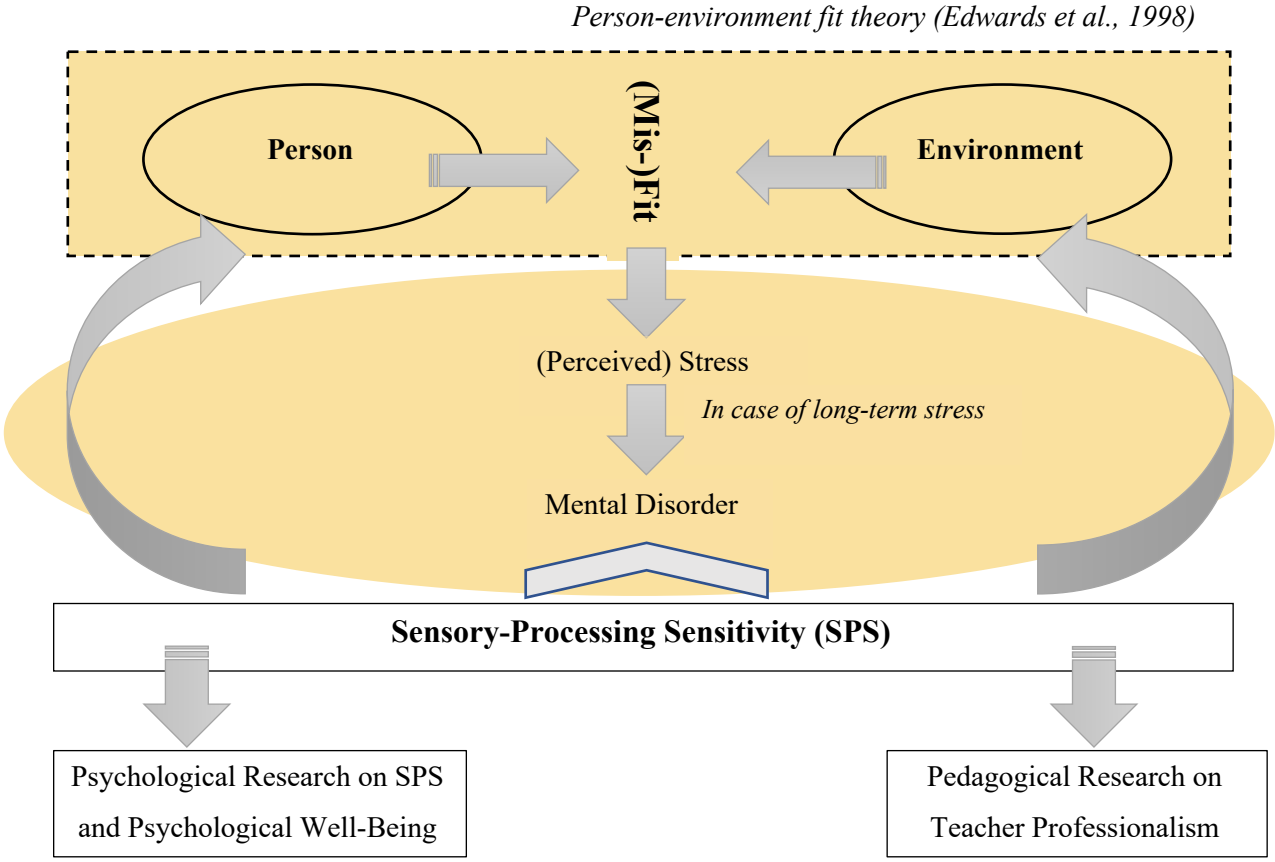

Figure 12. Own graphical depiction of the study's theoretical sections. Colored part represents the focus of the upcoming section.

4.1. The Person-Environment Fit Theory as an Interactional Approach of a Person and the Environment

The term person-environment fit (P-E fit) represents an umbrella term that includes a variety of different theories that all have the following three common assumptions (Su, Murdock, & Rounds, 2015):

> People seek out and create environments that allow them to behaviorally manifest their traits (e.g., dominant individuals seek leadership positions); the extent to which people fit their work environments has significant consequences (e.g., satisfaction, performance, stress, productivity, turnover), with better fit associated with better outcomes; and P-E fit is a reciprocal and ongoing process whereby people shape their environments and environments shape people. (p. 83)

P-E fit has its origin in organizational contexts and, in particular, the field of career counseling (e.g., Su et al., 2015). As indicated by the similarities of the conceptualizations, the framework

can be integrated into the general discussion of person-situation interactions as described previously and has already been viewed in that light for decades (e.g., Pervin, 1987). Walsh (2006, p. 622), for example, suggested a functional way of describing this interaction between the person (P) and the Environment (E), leading to certain behaviors (B) in the following way:

$$B = f(P, E)$$

One popular theory known within this framework is Holland's Theory of Vocational Personalities and Work Environments (Holland, 1997), who "suggests that individuals enter environments because of their personalities and remain in those environments because of the reinforcements and satisfactions obtained through the interaction in that environment" (Walsh, 2006, p. 622), which has been described in a previous chapter in line with research on teacher personality (see chapter 2.3.3.). However, numerous additional theories, such as the theory of work adjustment (e.g., Dawis, 2005), can be found in the literature as well (for an overview, see Su et al., 2015; Walsh, 2006). In addition to the organizational context, this framework has also been applied to research on stress and psychological / mental health (e.g., Edwards, 1990), even in the research field of teacher health (Pithers & Soden, 1999), salient to the present study.

4.2. Psychopathology and Related Basic Theories and Terms

Research on psychopathology, which is the focus of the upcoming sections will focus on, can be defined "as the study of the suffering of the mind", or "the study of mental illness or the understanding of behaviors and experiences that may indicate mental illness or impairment" (Weiner & Craighead, 2010d, p. 1358). Characteristic for this research area is the fact that these experiences lead to "manifestation of a behavioral, psychological, or biological dysfunction in the individual" (Stein et al., 2010, p. 1760) and "comprise a broad range of problems, with different symptoms. However, they are generally characterized by some combination of abnormal thoughts, emotions, behavior and relationships with others" as stated by the World Health Organization (WHO, 2018). Based on this broad conceptualization of psychpathology, the following chapters focus on the definition of important terms for the present study. In particular, those are the definition of stress (chapter 4.2.1.), the general effects of stress (chapter 4.2.2.), mental disorders as one effect of long-term stress (chapter 4.2.3.) and will conclude with two examples of mental disorders that are most common in the European and US-American context, namely depression and anxiety (chapter 4.2.4.). Finally, a summary of all

these terms is provided as part of section 4.2.5. and concluded with an excursus on the field of positive psychology (4.2.6.).

4.2.1. Definition of stress.

The term stress was first brought up by Selye (1974), who described it as a "nonspecific response of the body to any demand" (Selye, 1976, p. 137). In this definition, stress can be positive and negative in nature and "is associated with the expression of all our innate drives" (p. 137) that execute functions in order to re-establish a normal level in the body. Although this conceptualization is still valid to this day ("Stress," 2019), there is also some criticism to this Selye's (1974) definition, because these reactions were mostly seen as being physiological in nature and were only investigated in other fields of research years later. Since Selye took this term from a physical context, and due to his lack of knowledge of the English language, he "failed to distinguish between *stress* (the cause of wear and tear) and *strai*n (the effect, i.e., the wear and tear itself), calling them both *stress*" (Knapp, 1988, p. 181), which subsequently led to confusion in the literature as well as questions regarding the construct's validity (see Knapp, 1988 for a summary of this issue). A similar discussion can be found in the German literature, in which stress is often used to describe both stressors as well as effects of stress. This is particularly true with regard to research on teacher stress and well-being in which different definitions can be found (e.g., Braun, 2017; van Dick & Stegmann, 2013). Selye (1974, 1976) himself eventually solved this problem by calling the aforementioned response to particular demands stress and that which produces this reaction, a stressor.

Although stress is found in everyday life (i.e., typically bearing negative connotations when people express "feeling stressed" or "being stressed;" (van Dick & Stegmann, 2013, p. 44)), a generally accepted definition still cannot be found in the psychological literature. This is mainly due to the fact that definition and understandings of the term changed throughout the years based on the state of knowledge, theoretical background, as well as focus of a particular time and study (for a more detailed description, see Heinrichs, Stächele, & Domes, 2015, pp. 4-5). Among other aspects, one of these aforementioned differences was the point of view under which stress, its conditions, and consequences were analyzed. In particular, this leads to stress being conceptualized as representing stressful life events (e.g., Dohrenwend, Dohrenwend, Dodson, & Shrout, 1984), personality characteristics, or a reciprocal relationship between both.

Heinrichs and colleagues (2015) offer a summarized conceptualization of the term that will be the theoretical background of the present study: "*stress* results from a threat to the physiological and/or psychological integrity of a person, which causes an adaptive physiological, behavioral, emotional, and cognitive reaction" (p. 5).

Additionally, due to the fact that the present study focuses on the interrelation between people and their environments, a second definition of stress will build the theoretical foundation of the present study by describing the process of how stress is perceived by the person. This definition by Monat and Lazarus (1977) not only takes both aforementioned aspects into account, but also represents one of the most influential definitions in the field of stress research. In their definition, stress is defined as "any event in which environmental demands, internal demands, or both tax or exceed the adaptive resources of an individual, social system, or tissue system" (p. 3). Conceptualizing it in line with the person-environment fit framework, stress can also be defined as "negative person-environment relationships" (Lazarus & Folkman, 1987, p. 142) in a way that "the environmental demands exceed the individual's resources" (Aldwin, 2011, p. 17; for more detailed descriptions on this theoretical framework, see chapter 4.3.2.).

4.2.2. Effects of stress.

In those cases where stress is experienced, the human body reacts on different levels: the body, behavioral, and the cognitive-emotional levels, all of which are interrelated and can affect each other in both negative and positive ways. The particular reactions arising from stress on each of the levels are the following (Kaluza, 2011a, pp. 16-17):

- body-related consequences: processes aiming at increasing the availability of energy through faster heartbeat and breathing, higher muscle tension, etc.;
- behavioral consequences: "impatient behavior" (p. 17), including eating fast or skipping breaks; "self-numbing behavior" (p. 17) through eating or drinking more alcohol; "uncoordinated working behavior" (p. 17), such as doing a lot at once, being unorganized, forgetting things, etc.; "conflicts with other people" (p. 17), including aggressive behavior, discussions, etc;
- cognitive and emotional consequences: thoughts and emotions provoked in a person, such as nervosity, feelings of dissatisfaction, anxiety, feelings of helplessness, ruminating thoughts, etc.

However, the effects of stress are even more diverse, spanning effects on cardiovascular functioning, muscles, one's own sexuality, and a person's metabolism. Also important in this regard is the fact that those reactions are not executed equally in every individual. Furthermore, the particular bodily reactions depend on the specific situation (Kaluza, 2011a).

4.2.3. Mental disorders as a possible effect of distress.

Stress itself, however, is not necessarily something bad and threatening for an individual's mental health. Selye (e.g., 1974, 1976) differentiates between Eustress, which is defined as a positive experience and an expression of agility that in turn can act as a motivator and helps people learn and develop, and Distress as the negative side that is hazardous to health and occurs if not enough phases of relaxation and non-stress are available for the body to regenerate. These long-term stress levels can then lead to exhaustion and possibly physiological (including chronic strain, health-related risky behavior and and a weakened immune system) and psychological health problems (e.g., Kaluza, 2011a, 2011b), indicated by various symptoms. While stress itself does not represent a diagnostic criterion for a mental disorder, it is seen as a possible cause (e.g., development of a depression based on long-term stress or the trigger for a relapse in a case of alcohol addicition), consequence (e.g., given certain diagnosis, such as borderline personality disorder), covariate or an upholding factor of a particular mental disorders (Heinrichs et al., 2015). Diagnoses made in response to ongoing perceived stress are diverse and include a variety of disorders, such as Post-Traumatic Stress Disorder (PTSD), or adjustment disorder (Maercker et al., 2013).

In general, diagnoses for possible mental disorders are made based on the aforementioned resulting problems, impairments and symptoms experienced by the individual. These are then generally evaluated on the basis of summaries of symptoms for every diagnosable disorder in specifically developed manuals. Two of the widely accepted and commonly used manuals are the ICD-10 (International Statistical Classification of Diseases and related Health Problems), published by the World Health Organization (WHO, 2004) and the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders) published by the American Psychiatric Association (APA, 2013). While the first one is applied mostly in the European context, the second manual is specifically applied in the American cultural context. However, the fact that experts are continuously trying to develop a better understanding of aspects related to psychopathology, is

indicated by the regular updates of the aforementioned systems. During the ongoing year, for example, the newest version of he ICD (i.e., ICD-11) is planned to be published.
As a final remark, also the treatment of those diseases is developing during the last few decades, including high quality research studies, the development of treatment manuals and programs for different disorders, as well as valid measures, to only name a few examples. Dependent on diverse aspects, such as the nature and the severity of the respective disorder, patients can either receive outpatient or inpatient treatment in most countries, given the accessability of a health care system and related professionals.

4.2.4. Depression and anxiety: Two examples of common mental disorders.

The most common diagnoses across EU countries, which are also related to experiences of stress, include anxiety disorders, depressive disorders, alcohol and drug use, bipolar disorders and schizophrenia (OECD/EU, 2018, p. 21). According to the National Institute of Mental Health (NIMH, 2018) depression is also one of the most common diagnoses across the United States of America. Based on this overlap and the focus and available data of the present study, these diagnoses are also the main diagnostic examples in the present study. Both disorders can be defined as follows:

- "anxiety disorders include disorders that share features of excessive fear and anxiety and related behavioral disturbances. *Fear* is the emotional response to real or perceived imminent threat, whereas *anxiety* is anticipation of future threat" (APA, 2013, p. 189);
- depressive disorders include "the presence of sad, empty, or irritable mood, accompanied by somatic ad cognitive changes that significantly affect the individual's capacity to function" (APA, 2013, p. 155). The numerous different specific kinds of depressive disorders that can be diagnosed diverge with regard to "issues of duration, timing, or presumed etiology" (p. 155).

Furthermore, specific diagnoses can be understood better and made clearer when looking at the conditions and symptoms that have to be existent in order to be diagnosed with the respective disorder. Therefore, the upcoming table (Table 8) offers two kinds of diagnostic criteria for both diagnoses: One definition and related symptoms are based on the diagnostic criteria as described in chapter five of the International Classification of Mental and Behavioral Disorders (ICD-10) by the World Health Organization (WHO, 2016) and the second one is based on the

Diagnostic and Statistical Manual of Mental Disorders (DSM-V) by the American Psychiatric Association (APA, 2013).

While general diagnostic criteria exist for anxiety disorders, the major depressive disorder as a specific diagnosis was chosen as it "represents the classic condition in this group of disorders" (APA, 2013, p. 155). In order to keep the table well, the notes found in the DSM-V are not displayed as they include additional information that are used for children and adolescents. The original texts written in the ICD-10 are broken down into bullet points in order to be more comparable to those in the DSM. While the criteria for the DSM are from the book, which enabled the inclusion of specific page numbers, no pages are cited for the description of the ICD-10 as it is based on the cited webpage (WHO, 2016). This kind of citation was due to the fact that the most recent version was aimed at being applied in the present study, but it was not available as a printed version.

Table 8

Diagnostic Criteria for Anxiety Disorder and Depressive Disorder as Described in ICD-10 (WHO, 2016) and DSM-V (APA, 2013)

Diagnostic criteria in the ICD-10 (WHO, 2016)	Diagnostic criteria in the DSM-V (APA, 2013)
Anxiety Disorder F41: Other anxiety disorders "Disorder in which manifestation of anxiety is the major symptom and is not restricted to any particular environmental situation. Depressive and obsessional symptoms, and even some elements of phobic anxiety, may also be present, provided that they are clearly secondary or less severe." F41.1. Generalized anxiety disorder "Anxiety that is generalized and persistent but not restricted to, or even strongly predominating in, any particular environmental circumstances (i.e. it is 'free-floating'). The dominant symptoms are variable but include • complaints of persistent nervousness, • trembling, • muscular tensions, • sweating, • lightheadedness, • palpitations, • dizziness, and • epigastric discomfort. • Fears that the patient or a relative will shortly become ill or have an accident are often expressed."	Anxiety disorders (p. 189) • "Anxiety disorders include disorders that share features of excessive fear and anxiety and related behavioral disturbances. …. The anxiety disorders differ from one another in the types of objects or situations that induce fear, anxiety, or avoidance behavior, and the associated cognitive ideation. …. Anxiety disorders differ from developmentally normative fear or anxiety by being excessive or persisting beyond developmentally appropriate periods. They differ from transient fear or anxiety, often stress-induced, by being persistent (e.g., typically lasting 6 months or more)." 300.02: Generalzied anxiety disorder (pp. 206 and 222) "Social worries are common in generalized anxiety disorder, but the focus is more on the nature of ongoing relationships rather than on fear of negative evaluation. Individuals with generalized anxiety disorder, …, may have excessive worries about the quality of their social performance …." A. "Excessive anxiety and worry (apprehensive expectation), occurring more days than not for at least 6 months, about a number of events or activities (such as work or school or performance)." B. "The individual finds it difficult to control the worry." C. "The anxiety and worry are associated with three (or more) of the following six symptoms (with at least some symptoms having been present for more days than not for the past 6 months): Restlessness or feeling keyed up or on edge. Being easily fatigued. Difficulty concentrating or mind going blank. Irritability. Muscle tension. Sleep disturbance (difficulty falling or staying asleep, or restless, unsatisfying sleep). " (continued)

Diagnostic criteria in the ICD-10 (1993)	Diagnostic criteria in the DSM-V (2013)
	D. "The anxiety, worry, or physical symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning." E. "The disturbance is not attributable to the physiological effects of a substance (e.g., a drug of abuse, a medication) or another medical condition (e.g., hyperthyroidism)." F. "The disturbance is not better explained by other mental disorders …."
(Major) Depressive disorder F32 Depressive episode • "… the patient suffers from lowering of mood, reduction of energy, and decrease in activity." • "Capacity for enjoyment, interest, and concentration is reduced, and marked tiredness after even minimum effort is common." • "Sleep is usually disturbed and appetite diminished." • "Self-esteem and self-confidence are almost always reduced and, even in the mild form, some ideas of guilt or worthlessness are often present." • "The lowered mood varies little from day to day, is unresponsive to circumstances and may be accompanied by so-called 'somatic' symptoms, such as loss of interest and pleasurable feelings, waking in the morning several hours before the usual time, depression worst in the morning, marked psychomotor retardation, agitation, loss of appetite, weight loss, and loss of libido." • "Depending upon the number and severity of the symptoms, a depressive episode may be specified as mild, moderate or severe." F32.2: Severe depressive episode without psychotic symptoms "An episode of depression in which several of the above symptoms are marked and distressing, typically loss of self-esteem and ideas of worthlessness or guilt. Suicidal thoughts and acts are common and a number of 'somatic' symptoms are usually present."	Depressive disorders (p. 155) "The common feature of all of these disorders is • the presence of sad, empty, or irritable mood, • accompanied by somatic and cognitive changes • that significantly affect the individual's capacity to function. • What differs among them are issues of duration timing, or presumed etiology." 296.23: Major depressive disorder (pp. 160-161) A. "Five (or more) of the following symptoms have been present during the same 2-week episode and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure." B. "The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning." C. "The episode is not attributable to the physiological effects of a substance or to another medical condition." D. "The occurrence of the major depressive episode is not better explained by schizoaffective disorder, schizophrenia, schizophreniform disorder, delusional disorder, or other specified and unspecified schizophrenia spectrum and other psychotic disorders." E. "There has never been a manic episode or a hypomanic episode."

When comparing these two descriptions of diagnostic criteria for both diagnoses, major differences already immediately catch one's eye: The main difference can be found with regard to general definitions, which are not given in the ICD-10, but are relatively detailed in the DSM-5. This led to the situation that no general description could be given for anxiety disorders based on the ICD-10, but rather specific example diagnoses had to be specified in order to be able to summarize criteria. With regard to the content of the disorders and diagnostic criteria, they show a similar foundation. However, regarding depressive disorders, the depressive episode found in the ICD-10 includes more symptoms than the description of the DSM-5. The same is true for anxiety disorders.

4.2.5. Summarizing the relationship of terms related to stress.

The upcoming Figure (Figure 13) summarizes the terms defined in the previous sections graphically. It is important to note that the focus of this figure is the negative aspect of stress and its related consequences on mental health as this is also one main aspect of the present study.

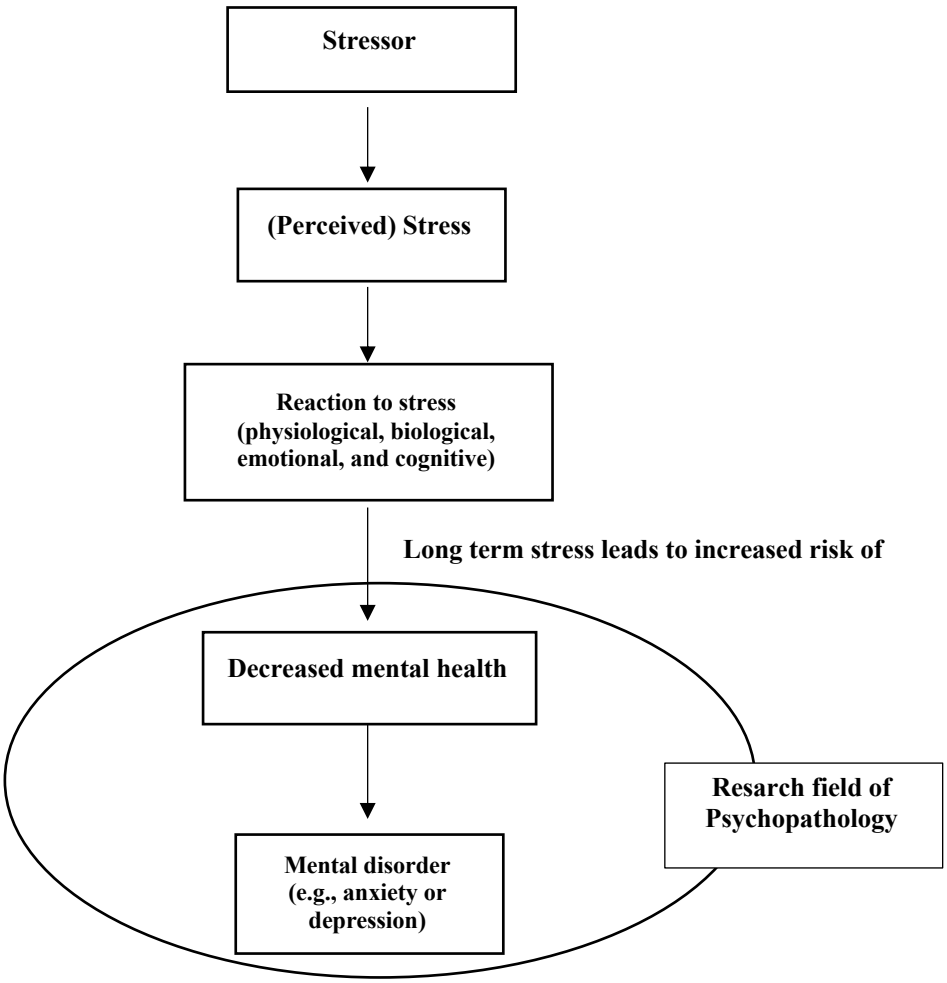

Figure 13. Summary of terms related to psychopathology and stress.

4.2.6. Excursus: Positive psychology - more than just absent psychopathology.

Finally, while the absence of psychopathology and related symptoms have been defined as psychological health so far, a "paradigm shift regarding optimal health" (Weiner & Craighead, 2010c, p. 1323) has been observed. In particular, the field of positive psychology aims at investigating the aspects that help people reach optimal health. It "began as a reaction against certain aspects of traditional psychology, namely, its focus on negative and problematic human behavior, such as psychopathology and what is wrong or deficient in people" (Weiner & Craighead, 2010b, p. 1266). Rather, it is defined as "a science of positive subjective experience, positive individual traits, and positive institutions" (Seligman & Csikszentmihalyi, 2000, p. 5).

4.3. Theories based on Person-Environment Interactions for the Onset of Mental Illness

The following paragraph contains three theoretical approach with regard to the development of mental disorders. While the first section, including a description of the Person-environment fit model (chapter 4.1.), represented the more general focus of the present study, it is now followed by two popular theories aimed at explaining the development of mental illness based on the interaction of a person and the environment. Those are, in particular, the diathesis-stress model (chapter 4.3.1.) and the transactional model of stress (chapter 4.3.2.). In the final chapter (chapter 4.3.3.), the model by Wittchen and Hoyer (2011) is introduced.

4.3.1. Diathesis-stress model.

The diathesis-stress model is one of the most popular theories aiming at the explanation of the development of psychological ill-health with a long history of research and development (e.g., Ingram & Luxton, 2005).

Based on the premise that not all people are all equally prone to psychopathology and the development of mental ill-health and mental disorders, it suggests the existence of particular personal characteristics that might make some people more vulnerable and consequently more susceptible to developing dysfunctional behavior in situations of adversity and life stress (Monroe & Simons, 1991; Wittchen et al., 2010). Specifically, it assumes that "stress activates a diathesis, transforming the potential of predisposition into the presence of psychopathology" (Monroe, & Simons, 1991, p. 406). This process of the diathesis and a stressor leading to the onset of psychological ill-health is described is graphically depicted in Figure 14 below. In consequence, this means that for people who would be seen as more vulnerable in this model,

lower levels of stress can already lead to dysfunctional behaviors (Wittchen et al., 2010). In comparison, people who do not show this maladaptive behavior are called resilient. The factors of the addressed diathesis are suggested to cover a variety of characteristics that are social, interpersonal, and cognitive in nature. They, in turn, consist of genetic dispositions, personality factors, and negative experiences in the environment, including poverty or bad treatment (e.g., Monroe, Slavich, & Georgiades, 2009; Wittchen et al., 2010).

This model has been widely used in the clinical context in order to explain development of various psychological disorders, including depression (e.g., Beesdo-Baum & Wittchen, 2011). Although these conceptualizations started out as additive models, in which the sum of stressors and the diathesis will lead to stress, there are various other concepts in relation to how this interaction really works and how it might change over time (for an overview, see Ingram & Luxton, 2005).

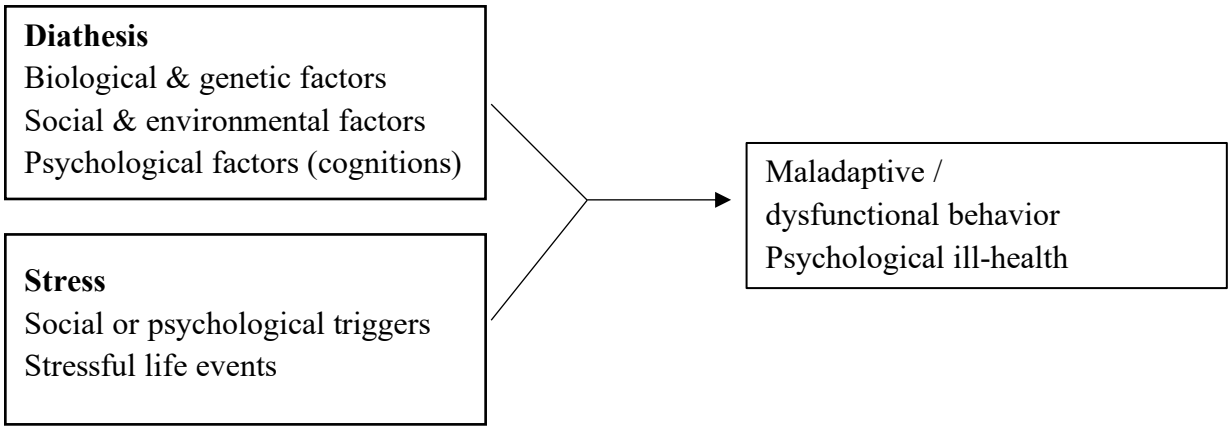

Figure 14. Stress development as described in the diathesis-stress model. The model represents an own model based on conceptualizations by Monroe and Simmons (1991).

Research in line with this model has been applied to various disorders using a variety of methods and definitions of life stress, one of the reasons why summarizing the present state of research is particularly difficult. However, in the following paragraphs, a few examples of research that aims at investigating characteristics making up the diathesis / vulnerability factor in a person are mentioned.

4.3.1.1 Examples of vulnerability factors originating in the environment.

With regard to external stressors, significant overlaps with concepts introduced in the chapters before can be found. For example, major life events as well as previous episodes of depression have been found to trigger the development of depression in some cases (e.g., Hammen, 2005; Kendler & Gardner, 2016; Kendler, Thornton, & Gardner, 2000).

4.3.1.2. Examples of vulnerability factors originating within a person.

With regard to genetic factors in the analysis of depression, a serotonin transporter gene has been discovered that is responsible for some people developing depression after experiencing stressful life events (e.g., Caspi et al., 2003). Furthermore, in line with research on suicide behavior, an impairment of affective decision-making was found to be related to later suicide attempts following depression (e.g., Clark et al., 2011).

With regard to depression, which as an assumed consequence of ongoing perceived stress is one main focus of the present study, negative cognitions have also been found to be vulnerability factors in interaction with stressful life events (Hilsman & Garber, 1995; Wittchen et al., 2010). This goes back to the concept by Beck (2008), who found depressed people to have more negatively-biased cognitions and views. In particular, Brown and Beck (2002) describe this process as “pervasive and systematic negative bias information processing” (p. 232).

Due to the role of dysfunctional cognitions as well as depression in general in the present study, the cognitive model of depression as one variation and adjusted version of the diathesis-stress theory will be discussed shortly at this point.

In the upcoming cognitive model of depression, which has been developed for more than four decades (for an overview, see Beck, 2008), it is suggested that particular life events and experiences can lead to the development of dysfunctional thoughts and attitudes. They are found within various cognitive structures and lead to cognitive vulnerability due to the dysfunctional nature of those attitudes. In cases of stress, those schemas are activated and develop a negative bias, which subsequently has an effect on the interpretation of the situation as well as particular symptoms of depression (called cognitive reactivity). If this circle is followed a few times, those schemas can lead to a depressive mode. This state further affects

other aspects of an individual, including emotions, behavior, and motivation. In cases of numerous stressful life events these schemas can fundamentally affect an individual's processing of information, which can subsequently lead to negative appraisal and limited reappraisal. With time, this process can lead to a state of clinical depression. For a graphical depiction of this process, see Figure 15.

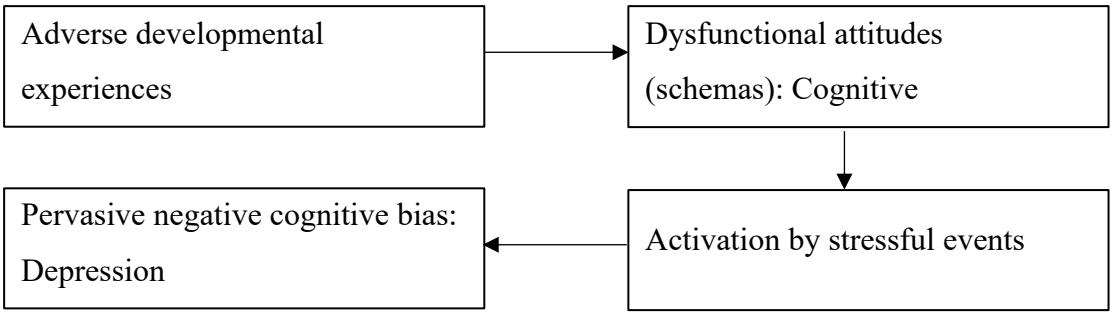

Figure 15. Model of depression by Beck (from: Beck, 2008, p. 972).

Finally, it is important to note that this model has also been applied to other mental disorders, including anxiety (e.g., Beck & Clark, 1997; Beck, Emery, & Greenberg, 1985).

4.3.2. The transactional model of stress and coping.

The transactional model of stress and coping by Lazarus and Folkman (1987; see also Lazarus, 2006) is another example of the most popular theories with regard to the development of stress. In particular, it aims at answering the question of whether all stressors are perceived the same way and have similar effects in all individuals. Contrary to suggestions made in other theoretical frameworks, such as the diathesis-stress model

(e.g., Monroe & Simons, 1991; for a more detailed description, see the previous chapter) it aims at describing the relationship between a person and the environment in a way that responses to situations and stressors might vary across individuals, dependent upon their coping strategies and personal resources (Lazarus, 2006; Lazarus & Folkman, 1987). This makes the transactional approach to stress a more state-focused theory, compared to the more trait-focused diathesis-stress model, which describes the vulnerability to the onset of mental illness based on certain personality characteristics that are relatively stable in nature, including, for example, genetic dispositions (e.g., Monroe & Simons, 1991).

Based on this model, individuals differ in regard to their perception and reactions to stress by cognitive appraisal, which are processes of evaluation of a particular situation and how this situation relates to a person's well-being. Specifically, appraisal in this theoretical context is subjective in nature and concerns to "the implications of that information for one's personal well-being" (Lazarus & Folkman, 1987, p. 145), while, in comparison, "*information* concerns what we know or think we know about the world and how it works" (p. 145).

The authors differentiate between two types of appraisal which act as mediators between a situation and a person's emotional reaction, which are understood as a set of reciprocal processes. These two appraisal types, namely primary and secondary appraisal, develop unconsciously and are automatic (e.g., Lazarus, 1991). Despite their name, it should be noted that they are not assumed to unfold in a particular order. These two appraisal processes are defined as follows.

Primary appraisal describes the "motivational relevance" of a situation or a stimulus (Lazarus & Folkman, 1987, p. 145; see also Aldwin, 2011). It evaluates "whether or not what is happening is *relevant* to one's values, goal commitments, beliefs about self and world, and situational intentions" (Lazarus, 2006, p. 75). Based on this conceptualization, it is assumed that when a person is confronted with a certain stimulus, the first appraisal is responsible for an evaluation of the situation or the stimulus itself. Resulting evaluations can then lead to three types of results (Lazarus & Folkman, 1987, p. 145; see also Lazarus, 2006):

1) the stimulus can be interpreted as irrelevant to the person and therefore has no significant meaning;
2) the stimulus can be interpreted as positive or beneficial;
3) the stimulus can be interpreted as a stressful condition because "the environmental demands exceed the individual's resources" (Aldwin, 2011, p. 17). This stressful situation, in turn, can be differenciated into three specific evaluations:
    - harm / loss: a person realizes that he or she has already been harmed (in the past; for example, through loss of an important person),
    - threat: a person expects the possibility of harm in the future, or
    - challenge: an individual expects positive emotions if the stressful situations are handled successfully and acts enthusiastically.

Summarizing these core assumptions, it can be said that various situations are not in general a source of stress or benefit, but rather can become one if they pose a confrontation to those characteristics that make a person vulnerable and are related to a person's goals. However, how particular situations are interpreted by a person depends on various personal characteristics, including a person's beliefs, motivation, or personal values, as well as environmental conditions, such as social resources, plus physiological measures including genetic or illness risk factors. Furthermore, a person's prior experiences with regard to their handling of particular stressful situations can also influence the first appraisal process (e.g., Lazarus, 2006; Lazarus & Folkman, 1987).

In their theory, Lazarus and colleagues (e.g., Lazarus, 2006) also talk about the importance of emotions in the process of appraisal. With regard to primary appraisal, emotions are evoked based on the evaluation of the situation on the basis of one's goals. In particular, in a positive condition, it is likely that positive emotions will arise, while vice versa is true as well. On the contrary, if a situation is not relevant for an individual's goal, no emotion will occur. A second aspect, which can be seen as predicting particular emotions experienced by an individual, is the association with a particular society. This includes variables like self-esteem or values, to only name a few examples (e.g., Lazarus, 2006).

The process of secondary appraisal focuses on actions available to a person when facing mostly stressful, situations. It can be interpreted as "nothing more than an evaluation of coping options" (Lazarus, 2006, p. 76; see also Lazarus & Folkman, 1987), while in this regard the cognitive basis of those coping strategies is intended. It can therefore be said that the way in which an individual interprets a situation also depends on his or her confidence in coping with stressful situations. In particular, if a person feels confident that he or she can overcome an obstacle, this stimulus might be more likely interpreted as a challenge and less likely as a threat. However, if the person's confidence is very low, a situation might be more likely to be evaluated as a threat. At this point, self-efficacy (Bandura, 1977, 1994), is seen "as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994, p. 71), and can be listed as one important personality characteristic and one reason why people differ in their experiences of stressful situations. This is because self-efficacy beliefs affect "cognitive, motivational, affective and selection processes" (p. 71) and "enhances human accomplishments and personal well-being in many

ways" (p. 71). Additionally, situations and stimuli (or in this situation possible stressors) themselves lead to people perceiving a situation either as a threat or a challenge. In particular, "the substantive contents of environmental variables influenc[ing] an appraisal consist of situational demands" (Lazarus, 2006, p. 77). Examples of "situational dimensions" (p. 77) as mentioned by Lazarus are, for example, "novelty-familiarity; predictability-unpredictability; clarity of meaning-ambiguity; and temporal factors" (p. 77). A third aspect responsible for differences between people's reactions to stress are experiences as well as a repertoire of coping strategies that are available to a person in a given stressful situation (e.g., Kaluza, 2011b; Lazarus, 2006).

If a situation is perceived as a threat and the resources needed to overcome this obstacle are not interpreted as being existent in a person, people initiate a process of coping as an attempt to reduce this perceived stress by reappraising the relationship between a person and the environment. Based on conceptualizations by Lazarus (e.g., 2006), this can be realized in two ways:

1) Problem-focused coping: An individual changes the relationship between the environment and him-/herself. The focus is on the problem and the individual, for example, allows people to develop behaviors and abilities to actively improve the situation;
2) emotion-focused coping: An individual changes the meaning of the relationship between the environment and him-/herself. The focus is on a decrease of negative emotional reactions to a particular stressful situation and changes in these reactions, such as the cognitive re-evaluation of a stimulus or avoidance of a certain situation.

Based on the descriptions above, it can be seen that the coping strategies include behavioral reactions (e.g., developing explicit coping strategies to guide behavior in a given situation, such as leaving the situation), as well as cognitive reactions (such as cognitive re-evaluation), toward stressful situations. Both can occur simultaneously or individually and can either support or hinder each other. Of significant importance in this model, however, are cognitive strategies. This is not only the case because they support that a person can successfully deal with a particular problematic situation, but also due to the fact that those strategies can have an effect on the primary appraisal process. This specific effect can be found in the final step, in which a

situation is re-evaluated and made available for the appraisal in future situations (Lazarus, 2006).

Which strategies are used exactly to cope with a certain stressful situation is dependent upon the specific situation and the previously perceived stressors. This is in line with the aforementioned more state-focused approach in which coping processes are not defined as stable, but rather as changing (e.g., Lazarus, 2006). It has been suggested that problem-focused strategies are more likely to be applied when a situation is seen as malleable, whereas emotion-focused coping strategies are more like to be applied when circumstances are evaluated as more fixed (Folkman & Lazarus, 1985). With regard to relationships between coping strategies and certain outcomes, Folkman and Moskowitz (2004) suggest that "certain kinds of escapist coping strategies are consistently associated with poor mental health outcomes, while other kinds of coping - such as the seeking of social support or instrumental, problem-focused forms of coping – are sometimes associated with negative outcomes, sometimes with poisitve ones, and sometimes with neither, usually depending on characteristics of the appraised stressful encounter" (p. 747).

Different coping strategies have been analyzed with regard to various mental disorders, such as depression. Results investigating the relationship with depression, for example, revealed that depressed individuals apply more strategies related to avoidance and denial. Furthermore, they do not seem to have the capabilities to also see positive aspects of stressful circumstances (Orzechowska, Zajączkowska, Talarowska, & Galecki, 2013). These results were supported by other studies, through which more ineffective strategies were also found in patients with depression, compared to those without depression (Pu et al., 2012). Similarly, less proactive coping strategies have also been found in elderly patients given higher levels of depression (Greenglass, Fiksenbaum, & Eaton, 2006).

With regard to the role of emotions in the secondary appraisal process, Lazarus (2006) states that "a person must evaluate three basic issues – namely, blame or credit for an outcome, coping potential, and future expectations" (p. 93). Furthermore, "both *blame* and *credit* require a judgment about wo or what is responsible for a harm, threat, challenge, or benefit" (p. 93). Consequently, it is assumed that there is a relationship between blame and anger as well as credit and pride. However, it is important to add that in order to be able to evaluate this

contingency, it has to be known who was in control and whether it was intentional. This can, for example, be seen in cases of frustration in which "frustrated people often look for someone or some institution to blame, a process traditionally labeled as scapegoating" (p. 93). All these parts of information described above influence the particular emotion that might occur in a specific situation.

In summary, it can be said that stress based on the transactional model of stress and coping depends on a person's state, including personal resources and confidence. Since stressful and threatening situations are re-evaluated after they have been (successfully) overcome, this process also changes given one's experiences with particular situations. Based on this focus on people's states and learning processes, it is not a fixed model, but rather can be changed and adjusted throughout the lifespan (e.g., Aldwin, 2011; Aldwin, Sutton, & Lachman, 1996). Furthermore, the definitions of primary and secondary appraisal are not meant to represent a timely order or importance, but rather differ with regard to the content and meaning in the process: While primary appraisal is responsible for the initial evaluation and decision whether a situation is of importance for a person's goal, secondary appraising processes focus on what can be done in order to successfully overcome a particular obstacle. As described above, both appraisals interrelate in various ways and affect each other.

4.3.3. The model by Wittchen and Hoyer (2011): An integrative approach of the diathesis-stress model and aspects of the transactional model of stress.

While the two theoretical models described above each have a different focus, it could already be seen that, for example in the model of depression by Beck (2008), some transactional aspects were found as well. Wittchen and Hoyer (2011) offer an extended and integrative version of the original diathesis-stress model. They describe it as an approach that is "interactional or biopsychosocial" (p. 20), because it "explains human behavior and the onset of psychological disorders as an interaction of biological, psychological and social groups of variables while including developmental aspects, such as developmental psychological and biological ones" (p. 20). In their model, they further include modifying variales, similar interactional models and theories, including the coping strategies of the transactional model (e.g., Lazarus, 2006) described in the previous paragraph (see chapter 4.3.2.) as well as short-term and long-term consequences of stress and mental disorders.

As can be seen in the figure (Figure 16) below, this model includes four general areas (i.e., vulnerabilities, exposition, modifying variables, and consequences). Vulnerabilities are conceptualized as internal (i.e., in the person) or external (i.e., in the social environment) and are assumed to be interrelated as well as related to stressful events. Given that people are exposed to stressful events this has a threefold (reciprocal) effect: on psychological factors, on the mental disorder, and on developmental factors. In particular, it can be seen that the relationship between stress and a mental disorder is moderated by psychological factors and developmental factors. Finally, consequences consist of imminent and long-term consequences, both are related to the respective mental disorder and each other respectively. Furthermore, a relationship between psychological factors and imminent consequences are observable in the model.

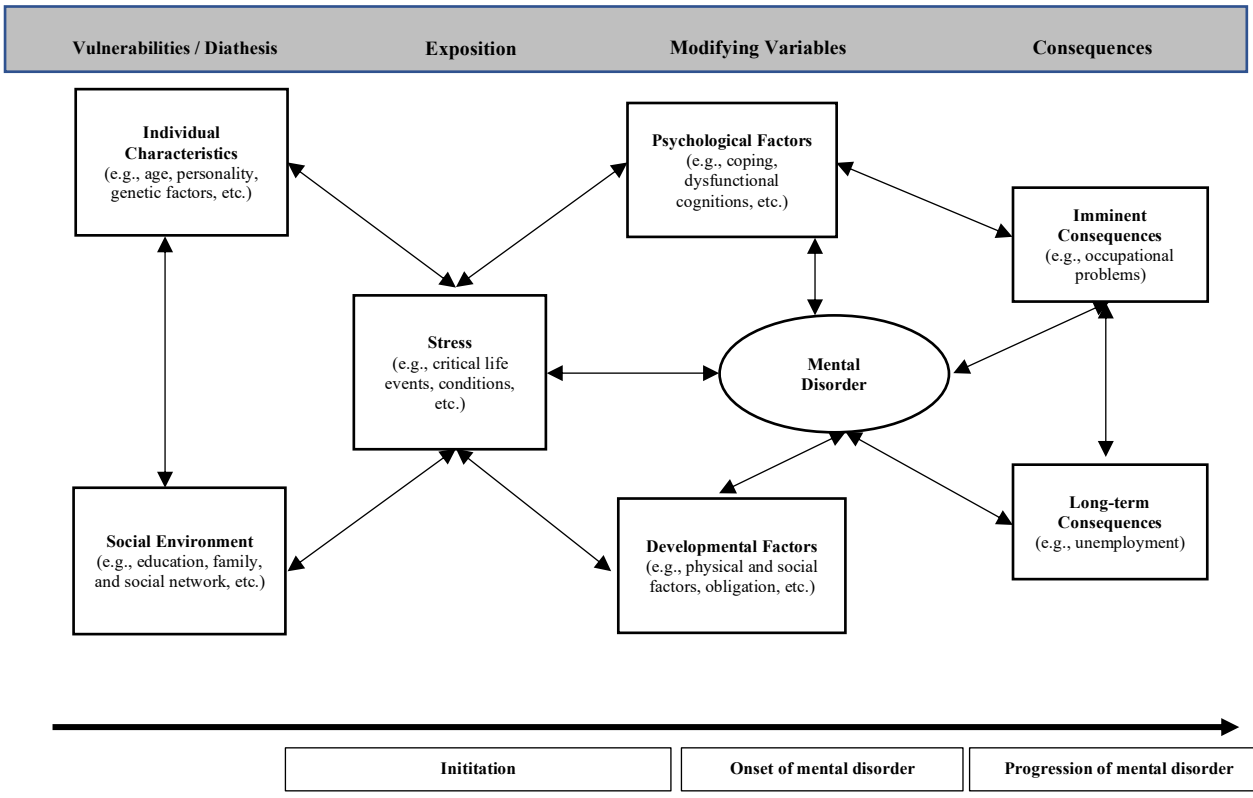

Figure 16. Diathesis-stress model by Wittchen and Hoyer (2011). Translations, slight reductions (i.e., the examples in the boxes), and adjustments (i.e., highlights set in the original model removed) realized by the author.

4.4. The Role of Personal Characteristics in Stress and Coping

As already described above, there is agreement with the fact that coping behavior is different across individuals (e.g., Lazarus, 2006). In his approach, Lazarus suggests stimulus-response

processes to vary between people through the effects of personality characteristics (Lazarus, e.g., 2006). In particular, he suggests various person-related variables and resources, which, among others, include:

- "personal resources include intelligence, money, social skills, education, supportive family and friends, physical attractiveness, health and energy, sanguinity, and so on" (p. 71);
- "beliefs about self and world" (p. 71);
- beliefs of self-efficacy (e.g., Bandura, 1994); in particular, one's ability to deal with certain demands and situations;
- dysfunctional cognitions (e.g., Brown & Beck, 2002); in particular, a biased view on the world in general and oneself.

Research studies aimed at answering the question regarding the relationship between the environment and personality characteristics on appraisal and coping processes revealed diverse results: Among numerous other researchers, de Ridder and Kerssens (2003), for example, analyzed the role of personal and situational characteristics and found both aspects to be important in explaining coping behavior. Additionally, a meta-analysis by Connor-Smith and Flachsbart (2007), empirically supports the moderating role of the Big Five in the coping process, although the evidence of the relationship to broad coping was weak. At the same time, however, the five traits were able to individually predict particular strategies. While extraversion predicted support-seeking and problem-solving and restructuring-strategies, neuroticism was able to predict strategies like withdrawal and emotion-focused processes and seeking support. The authors infer that their findings are important to "understanding the joint role of personality and coping in determining vulnerability to distress" (p. 1102). In line with research on the Big Five personality traits, and particularly neuroticism, it has been found that sensitivity to particular situations, such as threat, has an effect on coping strategies as well. Connor-Smith and Compas (2004) for example, showed that in the short term, individuals who are more sensitive to threat can benefit from disengagement, while the contrary is true for individuals less sensitive to threat. Similarly, Gunthert, Cohen, and Armeli (1999) investigated the role of neuroticism, as one of the Big Five variables that has been often investigated with regard to stress and coping (e.g., Bolger & Zuckerman, 1995). The reason for the repeated use of neuroticism within the research on stress is due to its conceptualization as an extreme sensitivity to negative stimulation, which suggests direct links to perceptions of stress (e.g.,

Tellegen, 1985). In particular, Gunthert and colleagues (1999) analyzed the role of neuroticism in every step of the transactional model of stress and coping. They found that individuals high on neuroticism evaluated the events they are confronted with every day as more stressful. In addition to this first stage of appraisal, it also influenced the second appraising step insofar as showing less confidence in being able to cope with the given stressors. These appraisals subsequently are assumed to result in emotional distress, which in turn might lead to negative affect, such as depression. With regard to specific coping strategies, Gunthert and colleagues (1999) report that individuals high on neuroticism apply more strategies that related to self-blame and are hostile in nature. This more frequent application of maladaptive strategies in people high on neuroticism was already found in prior studies (e.g., McCrae & Costa, 1986). In addition to neuroticism, McCrae and Costa (1986) also found relationships between extraversion and openness to experience and specific coping strategies. While extraversion, for example, was significantly positively related to positive thinking and expression of feelings, openness to experience was also positively related to expression of feelings, but negatively with faith in oneself. Additionally, they also asked participants if the coping strategies they applied were useful. While for neuroticism, the majority of the aforementioned coping strategies were perceived to be effective in the particular situation, this differed more significantly for extraversion and openness to experience. Individuals high on extraversion perceived rational action, humor, and self-adaption as effective strategies (among others), while distraction and expression of feelings did not reveal significant results with regard to effectiveness. In terms of the factor openness to experiences, expression of feelings and perseverance were not reported as effective strategies, but rather hostile reaction, distraction, escapist fantasy, substitution, and humor, among others, were reported as being effective.

As already mentioned before, these diverse results are only a few examples of the various theoretical and methodological approaches that have been applied to investigate ways in which personal characteristics might influence stress-related processes and coping. In an attempt to structure these findings and the role of personality on stress-related processes, Bolger and Zuckerman (1995, pp. 890-892) defined eight possible models with regard to exposure and stress reactivity (summarized as stress processes, including exposure and reactivity) as well as with regard to coping strategy choice and coping effectiveness (summarized as reactivity processes, including coping choice and coping efforts).

For the purpose of the present study, the most important and empirically supported four possible models are described in summary below.

- Differential exposure model: With this model (see Figure 17) it is assumed that exposure to stressors is affected by specific personality traits, but that there are no effects on reactivity. It is assumed to follow a mediation model with exposure acting as a mediator for the relationship between personality and stress outcomes. For example, it has been found that 'life changes' mediated the relationship between neuroticism and psychological effects (Ormel & Wohlfahrt, 1991).

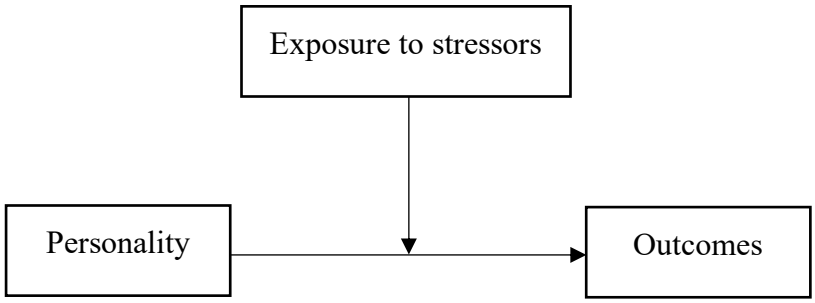

Figure 17. The differential exposure model (own development based on descriptions by Bolger & Zuckerman, 1995, p. 890).

- Differential coping choice model: Personality traits can have an effect on the choice of strategies, but not the effectiveness; this is conceptualized in a way that choice of strategies mediates the relationship between personality and outcomes. In line with that and more specific, "personality leads to the differential choice of coping strategies, and these strategies, in turn, lead to stress outcomes" (p. 892). This model (depicted in Figure 18) was supported in various studies (for a review, see Bolger & Zuckerman, 1995, p. 892).

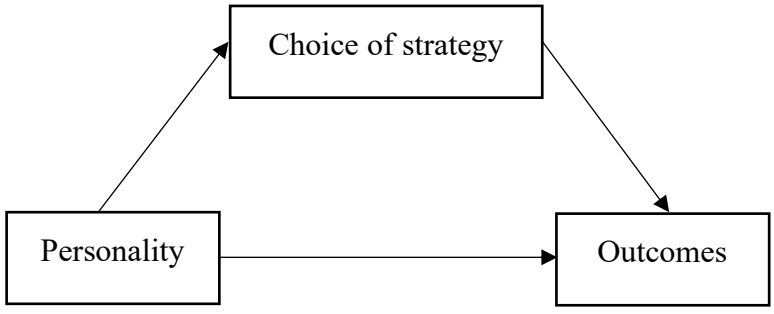

Figure 18. The differential coping choice model (own development based on descriptions by Bolger & Zuckerman, 1995, p. 892).

- Differential reactivity model: Personality differences can only be found with regard to reactivity, but not exposure; it is conceptualized in a way that personality moderates the relationship between stressors and subsequent outcomes (see Figure 19 for a graphical overview). Compared to the differential exposure model, more research has been conducted on the differential reactivity model. In particular, the following characteristics have been shown to moderate the aforementioned relationship: locus of control, hardiness, explanatory style, and self-consciousness (for a review, see Bolger & Zuckerman, 1995, p. 891).

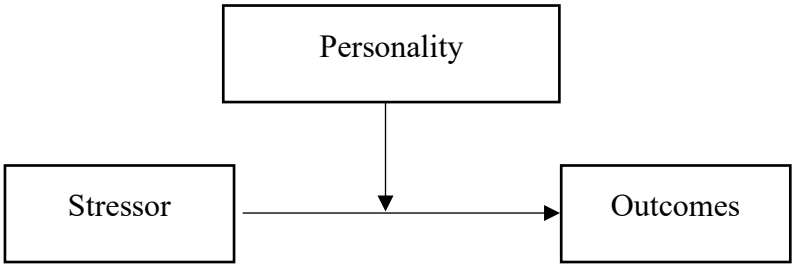

Figure 19. The differential reactivity model (own development based on descriptions by Bolger & Zuckerman, 1995, p. 891).

- Differential coping-effectiveness model: Personality differences do not affect coping choice, but reactivity; this is conceptualized in a way that personality characteristics moderate the relationship between choice of strategy and effectiveness (see Figure 20). "In other words, some people may experience adverse outcomes following a stressful event not because they choose normatively maladaptive strategies but because they choose strategies that are ineffective for them alone" (Bolger & Zuckerman, 1995, p. 892). This model has not often been applied in scientific research. One study, however, that partially supported this model was conducted by Gunthert and colleagues (1999), applying neuroticism as the personality trait of interest in their study.

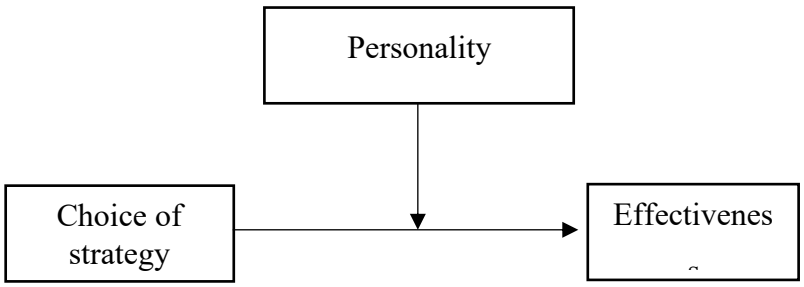

Figure 20. The differential coping-effectiveness model (own development based on descriptions by Bolger & Zuckerman, 1995, p. 892).

As can be seen by the different models described above, numerous ways exist through which personal characteristics can affect an individual's exposure and reaction to stressful situations. Furthermore, it becomes clear that although it is accepted that an individual's perception of stress and the subsequent application of coping strategies is dependent on various personality characteristics, some questions with regard to specific structure and nature of these relationships reveal diverse findings or are still open and warrant further research (e.g., Bolger & Zuckerman, 1995).

4.4.1. Classification of sensory-processing sensitivity within the theoretical framework of stress and coping.

When comparing the specific characteristics found with regard to SPS, as described in chapter 3.1., with the different models on the effect of personality on coping above, three models seem applicable:

- The differential coping choice model suggests that personality traits might influence which coping strategies are chosen in a certain stressful situation, which subsequently have an effect on the particular outcome. It can be said that coping strategies are used to explain the relationship between personality variables and specific stress outcomes. Based on one of the main characteristics of HSPs as being easily overwhelmed by processing more information than non-HSPs, they need more time to withdraw in order to be able to process the information. Due to this need it might be assumed that HSPs tend to choose more strategies that represent this need, such as being alone in stressful situations or not asking other people for help. Based on the coping strategies defined by Folkman and Lazarus (1988), these behaviors would fall into the aspect of distancing and escape-avoidance. Furthermore, the strategy of seeking social support might not found to be distinctive in HSPs.
- A second model that could be transferred to the theory of SPS would be the differential reactivity model. Given the increased emotional reactivity that goes along with higher levels of SPS in combination with deeper information processing, it might be the case that HSPs would react to stress more extremely than non-HSPs. This was not only suggested theoretically (e.g., Wyller et al., 2017), but already empirically supported by applying an experimental approach through which negative experience was manipulated (E. N. Aron et al., 2005). In this study, HSPs were found to react more strongly to the negative experience than non-HSPs measured by feelings like "sad", "anxious" and "depressed" (p. 190). This

is also in line with the hypothesized role of the environment, particularly during childhood, for the well-being of HSPs (see chapter 3.6.). People with high levels of SPS and an adverse childhood tend to be more prone to mental illnesses than those with a supportive environment (E. N. Aron et al., 2012), showing once more that those negative affects might be perceived especially strongly by HSPs. Numerous studies supported this interaction from a view point of SPS (e.g., E. N. Aron & Aron, 1997; E. N. Aron et al., 2005; Meyer & Carver, 2000), but also in other theoretical frameworks, such as the differential susceptibility model and the biological sensitivity to context thesis (for an overview, see Belsky & Pluess, 2009).

4.5. Stress and the Teaching Profession: A Summary of Recent Empirical Findings

The teaching profession is perceived as highly stressful (Newsberry & Allsop, 2017). This is highly related to the complexity of the teaching profession and related characteristics as described above (see chapter 2.2.1.2.). Consequently, teacher health has also gained interest in the empirical literature since the late 1990s. Particularly in Germany, this topic was triggered by two aspects: First, the high number of teachers who retired early, some of which were due to mental health problems. For example, in an investigation by Weber (2004) in Bavaria, Germany, it was found that mental disorders were the main reason for early retirement for 52% of all retired teachers. Due to the introduction of benefit cuts in case of early retirement in 2011, this percentage began to decrease (K. Lüdtke, 2017). Throughout the years, this trend changed a few times, in 2017, only 12% of teachers are retired early due to invalidity (Destatis, 2018). On the other hand, it became an important topic in the population due to the publication of the study by Schaarschmidt (2004), a big study on teachers' well-being conducted in Potsdam, Germany. Although it has recently been critiqued increasingly, it was one of the first systematic empirical investigation on teachers' mental health. In particular, Schaarschmidt and colleagues aimed at investigating the strain of teachers and responsible conditions as well as possible measures in order to decrease teachers' strain (Schaarschmidt, 2004). In particular, almost 16000 participants filled in their questionnaire "Arbeitsbezogenes Verhaltens und Erlebensmuster" (AVEM; "Work-related pattern of behavior and experiences") (Schaarschmidt & Fischer, 2001). They aimed at analyzing different coping patterns based on engagement, psychological resistibility and emotions. Results suggested four clusters, two of which were defined as risk patterns. While the most positive cluster was characterized by high engagement, abilities to cope with stress and strain as well as positive emotions, the opposite characteristics

were found for teachers assigned to the risk pattern B, representing the most unfavorable pattern (Schaarschmidt & Kieschke, 2013). In comparison to other occupations and professions, the highest percentage of teachers, equaling to roughly one third, of teachers was found in the aforementioned risk pattern B. Another third was assigned to risk pattern A, which is characterized by an excessive engagement, decreased resistability and negative emotions.

This topic, of course, also plays an important role in the international research field and findings have been generated across continents and countries (e.g., Aydin & Kaya, 2016; Chaplain, 2008; Cinamon & Rich, 2010; Kyriacou, 2001; Scheuch, Haufe, & Seibt, 2015; Skaalvik & Skaalvik, 2015). For example, 73% of the participants 30,000 individuals (80% teachers) participating in the Quality of Worklife Survey, administered by members of the American Federation of Teachers (AFT, 2015), replied to the question how often they found their work stressful with "often" (p. 3). Furthermore, 78% of participating teachers report being physically and emotionally exhausted after a work day. A study conducted in England also revealed evidence for the fact that the teaching profession belongs to those six professions with low psychological, mental and physiological well-being (Johnson et al., 2005).

The variables used to operationalize stress are diverse across studies and range from stress and burnout (e.g., Cinamon & Rich, 2010) to perceived tension (e.g., Harmsen, Helms-Lorenz, Maulana, & van Veeren, 2018), to only name a few examples, further contributing to the complexity of this research field. The upcoming section aims at offering a summary of some important findings. Because the present study is based on the differentiation between a person and the respective environment, recent empirical findings are also summarized based on this separation in the upcoming two sections. However, in line with the current literature (Furr & Funder, in press), the development and perception of stress is best explained by the interaction of both entities, and thus should be kept in mind in the following chapter.

4.5.1. The role of personal factors for research on teacher stress.

In a previous chapter, different personality traits and other personal characteristics have been introduced to the teaching profession already (see chapter 2.3.3.). Therefore, they are only repeated shortly at this point: In particular it has been found that neuroticism is significantly positively related to perceived strain (Mayr, 2014; Smidt, Kammermeyer, Roux, Theisen, & Weber, 2018). Furthermore, based on a sample with teacher educators, Jain, Tyagi, and Kumar

(2015) revealed evidence for the fact that more introverted participants are more likely to perceive stress than extraverted techer educators. A second personal characteristic found to play an important role is self-efficacy (Bandura, 1977). Smidt and colleagues (2018), for example, found a significantly negative relationship between stress and occupational self-efficacy. A similar result (i.e., the relationship between self-efficacy and burnout) was also found by an additional study (Aloe et al., 2014). Relating back to the Big Five personality traits, occupational self-efficacy was found to be significantly negatively corelated with neuroticism and positively with openness (Smidt et al., 2018). Additionally, internal locus of control is related to perceived stress with a small effect size (Smidt et al., 2018). Similarly, control over the work place characteristics was also found to be significantly negatively correlated with psychological distress (Tuettemann & Punch, 1992).

A final important aspect with regard to these factors are the strategies people apply when experiencing stress (e.g., Lazarus & Folkman, 1984). This aforementioned theoretical assumption has been tested empirically with teachers as well. In general, it has been found that strategies that focus on flight or avoidance can be interpreted as dysfunctional, because they have been found to relate to psychological ill-health (Folkman & Moskowitz, 2004). Findings with regard to strategies, such as problem-focused strategies, have been associated positively and negatively with mental well-being. In general, it is always dependent on the specific situation (e.g., Carver & Scheier, 1994; Cheng & Cheung, 2005; Folkman & Moskowitz, 2004). For example, problem-focused strategies are useful if the situation is changeable, but not if it is not changeable. Rather, in this case emotion-focused coping would be relevant (Folkman & Lazarus, 1988). It is therefore important to have a variety of coping strategies and be able to choose from them based on the specific situation (Lehr et al., 2008). Looking at the empirical evidence in this regard with teachers, in particular resignation and avoidance have been found to be ineffective (Griffith, Steptoe, & Cropley, 1999; Lehr, 2004), whereas searching for social support has been found to be more effective (Lehr et al., 2008). Furthermore, listening to music and the feeling of support by family and friends were found to be the most commonly used adaptive coping strategies among special education teachers in the US (Cancio et al., 2018). Dunham (1994), for example, summarized the findings of his study in which he investigated the most commonly applied strategies by teachers into four areas: “personal, interpersonal, organisational and community” (p. 169). In addition to positive attitudes, he found that teachers used physical exercise and relaxation techniques to cope with the stress. With regard to

interpersonal resources, previous findings included talking to one's spouse, family in general and friends, were supported. Furthermore, in line with community-related strategies, memberships in clubs, hobbies and different activities are mentioned. Similarly, another study found "recreation" (Soyibo, 1994, p. 191) and related activities to be important coping strategies across Jamaican high school science teachers. This was true in addition to strategies like "accepting a situation as it is", or "sharing ideas with colleagues". In addition to the aforementioned strategies of social relationships and a positive attitude Richards (2012) also found humor and times of solitude to be useful for teachers to deal with stress. He confirms that his findings replicate those of an earlier study by Botwinik (2007), who found similar strategies among teachers.

One popular study in Germany was conducted by Lehr and colleagues (2008), who aimed at investigating different strategies among two samples of participants: those who were working and those being clinically treated participants and at the same time focusing on the interrelation between those two groups (see also Lehr, 2008). Using a questionnaire listing different coping mechanisms, they applied cluster analyses to the data of both groups simultaneously. Findings suggested the existence of three clusters, which they called Ruminative-self-isolating, Flexible-compensating, and Mixed-compensating coping pattern. In particular, all these patterns differed from each other with regard to the specific coping strategies applied. For example, the ruminative self-isolating pattern includes strategies like social isolation and withdrawal or no active relaxation. It was found that teachers with mental disorders, including for example depression were more likely to be found in this cluster. In comparison, healthier, working teachers were found in the cluster Flexible-compensation, which included the ability to think about something positive and a decreased tendency so isolate oneself in stressful situations.

4.5.2. The role of environmental aspects for research on teacher stress.

The significance of the role of environmental aspects and characteristics of the working conditions have their origin in the fact that "teacher stress is often defined as the experience by a teacher of unpleasant emotions resulting from aspects of the work as a teacher" (Skaalvik & Skaalvik, 2016, p. 1786). Noise, for example, has been related to teacher stress (Dorsemagen, Lacroix, & Krause, 2013; Schönwälder, 2005). As a second example, working hours have been reported to be able to lead to emotional exhaustion, particularly if an individual perceives them as longer than those of colleagues (Dorsemagen, Krause, & Lacroix, 2008). Weekly working

hours are also significantly related to perceived stress (Smidt et al., 2018). Furthermore, work load and time pressure have been found to predict (emotional) stress (AFT, 2015; Skaalvik & Skaalvik, 2015), emotional exhaustion and burnout (Skaalvik & Skaalvik, 2011). Finally, class size has been reported to be a stressor (AFT, 2015).

With regard to students, behavioral problems, problematic undisciplinary and disruptive behavior, all play an important role in teachers' perceived strain (AFT, 2015; Aydin & Kaya, 2016), psychological distress (Chaplain, 2008), and negative emotions as well as tension (Harmsen et al., 2018).

5. The Importance of Research on Sensory-Processing Sensitivity as a Theory of the Person-Environment Interaction in the Field of Teaching and Mental Health: The two Main Goals of the Present Study

In the last few decades, research on SPS and the other three related theories has made profound developments investigating individual differences in people's sensitivity to environmental stimuli. Studies have made significant contributions to the importance of the environment in human development and its positive and negative effects on people's behavior and psychological well-being. However, as is the case with many new concepts, some if not many questions are still unanswered, different basic conceptualizations are not totally clear and some additional aspects have not yet been investigated. At the same time, the interest of the general public in the topic is very big and an increasing amount of book, coaching and other resources can be found. This, consequently, does not only lead to research lagging behind, but also to a significant gap between the general population and the scientific field, which often leads to misunderstands and misconceptions that could "potentially even harm [to] the public" (Greven et al., 2018, p. 6). One of the most profound misconceptions of SPS in the general public is the conceptualization of the trait as a diagnosis or a mental disorder (see for example the criticism by Meißner, 2015; see chapter 3.10.), which it is not intended to be.

In order to close these gaps and find answers to open questions that remain, it is important to continue conducting research and, consequently, to provide and effectively communicate such findings to the public. Two areas that are assumed to be especially important in this regard the role of SPS in the work place, as well as implications of SPS for psychological well-being (i.e., Greven et al., 2018, p. 5), which are both addressed in the present study. In particular, the present study addresses the following two (for this purpose simplified) broader research gaps:

1) The investigation of the role of SPS within the work place, particularly within the context of the teaching profession.

2) An analysis of possible mediators with regard to the association between SPS and psychological ill-health on the basis of recent theoretical and empirical advancements in the research area. Furthermore, this also includes a first exploratory analysis of the role of SPS in the clinical context (i.e., also based on a teacher sample).

Both goals are described in more detail as well as related back to the theoretical background above separately in the following two sections before the specific research questions and hypotheses of the present study are subsequently stated. In the graphical depiction of the content, now, all parts are connected in the two upcoming chapters. To not color the while Figure, the original is added at this point as a final concise overview (see Figure 21).

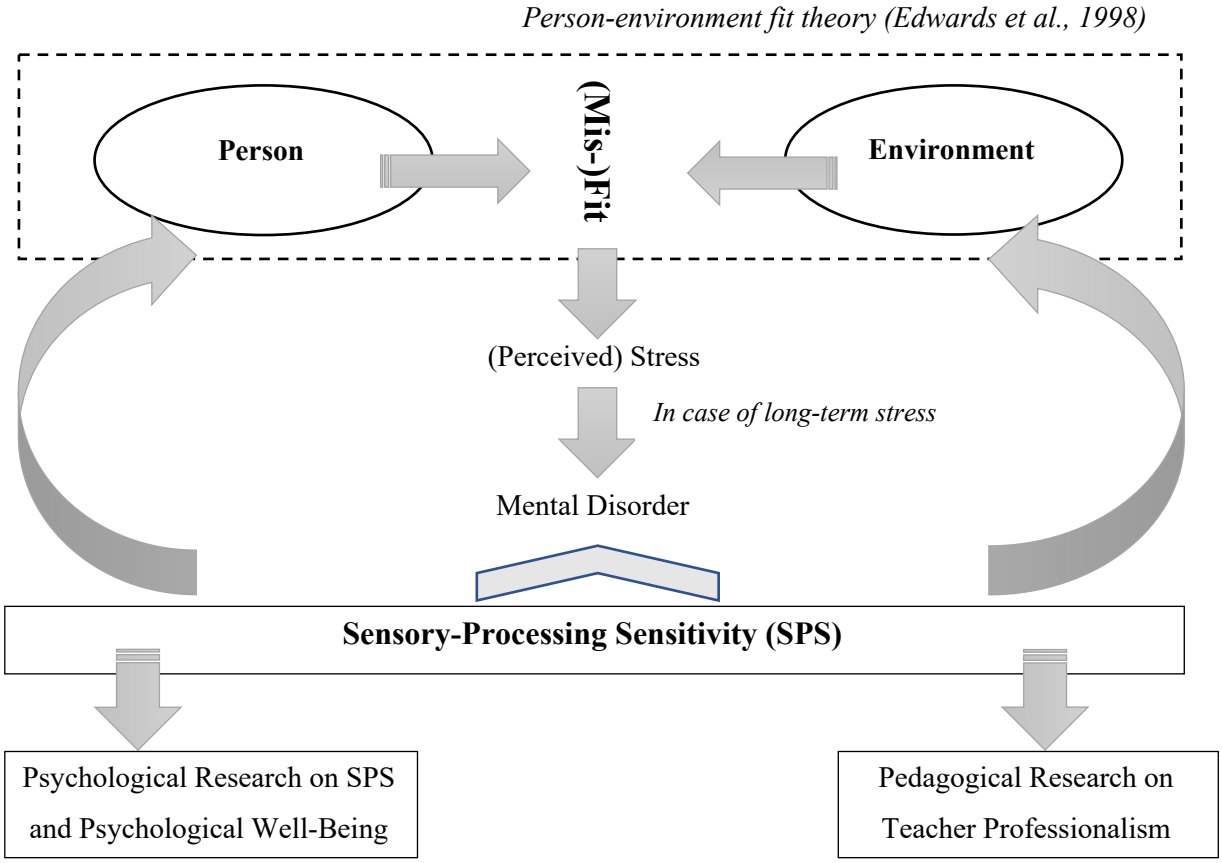

Figure 21. Own graphical depiction of the study's theoretical sections.

5.1. Sensory-Processing Sensitivity and the Workplace of Teachers

In research on teacher well-being, the importance of the interaction of a person and the environment has been emphasized in numerous theories. However, so far, most studies have not considered both aspects simultaneously. The present study aims at filling in this research gap by introducing the trait of SPS in this line of teacher research that integrates both entities. Furthermore, looking at this research gap from the SPS research field perspective, it can be said that to this day, only one study has been conducted that investigated SPS in the teaching environment. In particular, despite the repeatedly investigated elevated risk of mental ill-health in HSPs in highly stimulating environments (which also includes the school context), HSPs also show characteristics that are found to be very valuable for the profession. For example, as was already described above (see chapter 3.8.), HSP teachers were found to be very empathic, considerate, emotionally reactive and reflected, all of which are characteristics that are important for the teaching profession as well (e.g., Stefan Lindsay, 2017; Acevedo et al., 2014). This also relates back to findings suggesting stronger responses in HSPs to not just negative, but also positive stimuli (E. N. Aron et al., 2012). They are assumed to want to help despite possibly low energy and resources (Stefan Lindsay, 2017).

While the study by Stefan Lindsay (2017) already provided first evidence for the importance of HSPs in the work place and some underlying coping strategies and perceived difficulties HSPs might face in the work place, there are still some research gaps that are addressed by the present study. On the one hand, this includes extending the analyses to general schools and not just schools for special needs education. Secondly, some of the stressors HSPs were found to be challenged by in the teaching work place are investigated more strategically and based on a greater variety of characteristics. Finally, the variables measuring psychological ill-health in the present study, are more diverse and do not only include burnout.

5.2. Sensory-Processing Sensitivity and Mediators influencing its Relationship with Mental Ill-Health – Sensory-Processing Sensitivity in the Clinical Context

Contrary to the field of SPS in the work place, which is barely existent, numerous research studies have been conducted with regard to associations between SPS and psychological ill-health and mental disorders. However, most studies applied correlational analyses and investigated non-clinical samples. While two studies applied analyses based on a clinical sample (e.g., Hofmann & Bitran, 2007; Neal et al., 2002), they neither compared the results

with those revealed by participants without any diagnoses, nor did they consider any effects of the therapeutic process. Furthermore, none of these studies applied a vantage sensitivity point of view, which importantly considers also the positive effects of the therapeutic process, a necessary consideration that has been critically stressed in recent literature (e.g., Pluess, 2015).

Similarly, the underlying processes responsible for the number of significant relationships between SPS and numerous variables indicating low psychological well-being, are still unknown. To this day, only in the study by Brindle and colleagues (2015) state any suggestions for underlying processes and variables behind this association, which included acceptance of negative emotions and emotion regulation strategies (see also Greven et al., 2018; Wyller et al., 2017). Based on this lack of conceptualization, Wyller and colleagues (2017) suggested a model with possible underlying mechanisms. In particular, they suggest that "not SPS per se [that] should be regarded as psychologically inexpedient but rather the subsequent cognitive processes associated with the experiences conferred by the (assumed) trait" (p. 2). In addition, they also consider the influence of emotional experiences in their model.

When appealing to such a model as a framework in which to situate SPS research (as is the case of the present study), one can observe numerous overlaps with other models of stress and coping. For example, the diathesis-stress framework (e.g., Monroe & Simons, 1991) has been assumed to be the common theoretical basis for the vast majority of studies investigating the relationship between SPS and psychological ill-health. It suggests certain vulnerability factors, which in the face of adverse experiences and stress, can lead to the onset of mental ill-health. However, in addition to this negative bias having been highly criticized (e.g., Pluess, 2015), it does not explain much about the underlying processes either. Beck's model of depression (e.g., 2008), however, which was developed off the diathesis-stress model, does point toward a substantiating mechanism. Namely, he suggests that people can become cognitively vulnerable due to specific life events that in turn lead to the automatization of dysfunctional thoughts and attitudes. When experiencing stress, these schemata are activated and, based on this aforementioned vulnerability, they process information and interpret situations differently. Although there are fundamental differences between the model by Wyller et al. (2017) and Beck (2008), the basic assumption suggesting that the perception of situations can be affected by processes of information processing, is a significant similarity in both models. Furthermore, the role of dysfunctional cognitions (e.g., Brown & Beck, 2002) in the association between SPS

and stress-related variables and symptoms has never been tested in line with research on SPS and represents a research gap that might lead to further insights into the processes behind this association. Furthermore, when considering it from a different perspective, HSPs might be also more prone to develop certain dysfunctional cognitions based on their enhanced information processing.

Secondly, the transactional model of stress and coping (e.g., Lazarus & Folkman, 1987) suggests that within the first step of primary appraisal, physiological and genetic factors might contribute to the evaluation of whether a situation is perceived as a stressor as exceeding an individual's resources. This process, in turn, evokes certain emotions. In line with the secondary appraisal, which includes the choice of strategy that people apply to deal with a certain situation that is perceived as stressful, this is also assumed to be influenced by certain personal characteristics, such as self-efficacy (e.g., Bandura, 1994). Choice of coping strategies (Lazarus, 2006) is assumed to also be affected by certain characteristics, such as dysfunctional cognitions (Brown & Beck, 2002), consistent with the model by Beck (2008). However, how exactly personality-related characteristics influence coping behavior is not yet clear. Rather, numerous models have been suggested (e.g., Bolger & Zuckerman, 1995). The solution that seems the most accurate in line with the recently suggested model by Wyller and colleagues (2017) seems to be the differential reactivity model, suggesting individual difference with regard to people's reactivity to certain situations. However, the choice of strategy model also seems to be applicable in SPS research as it suggests that personality characteristics influence their selection of coping mechanisms. Particularly when looking at the characteristics that go along with SPS, such as need for recovery and quiet time in order to process information (e.g., E. N. Aron & Aron, 1997) it seems reasonable to assume that HSPs might chose different strategies than non-HSPs. However, this question has not been addressed yet and still displays an important research gap the present study aims at addressing.

Finally, the model by Wittchen and Hoyer (2011) combines personality aspects, and at the same time considers coping strategies and dysfunctional cognitions, two examples important in the present study as possible mediating aspects in the onset of mental ill-health in face of stressful life events. As described above, it is an approach combining the most prominent aspects of the diathesis-stress model and the transactional model of stress and coping (e.g., Lazarus, 2006). Summarizing these overlaps, it can be said as follows:

- People with high levels of SPS might experience more stress due to cognitive reactivity (e.g., the model by Wyller et al., 2017), as well as the suggestions in line with the differential reactivity model by Bolger & Zuckerman, 1995), which might also lead to an enhanced emotional experience.
- Although the diathesis-stress framework (e.g., Monroe & Simons, 1991) has been critized as being too focused on psychopathologic aspects from the perspective of SPS research (Pluess, 2015), the model of depression (Beck, 2008) might still be useful to further understand underlying processes. In particular, the construct of cognitive schemata that develop through life events and that are activated in certain situations, representing some kind of a cognitive vulnerability, might be one example process for the cognitive reactivity that is assumed to be a characteristic of SPS.
- SPS (as one personality characteristic) is assumed to lead an individual to choose certain coping strategies that are in line with the trait's specific characteristics (i.e., choice of strategy model; Bolger & Zuckerman, 1995).
- Dysfunctional cognitions and coping strategies might be mediators with regard to the association between SPS, stressors, and mental ill-health (see the model by Wittchen and Hoyer, 2011) for the onset of mental illness.

The following chapter aims at offering a concise structure of specific research questions and hypotheses relevant for the present study.

6. Research Questions and Hypotheses

The following chapter describes all research questions and hypotheses relevant for the present study. While the first chapter represents preliminary analyses and results (chapter 6.1.), the remaining main areas of interest and analyses have been summarized in four overarching aspects that are depicted in the figure below as well (Figure 22). Throughout the following two chapters of this chapter, the structure of this figure will be used to lead through the different research questions and results in order to guide across the main parts. In particular, those represent the validity of the construct of SPS (as part 1; see chapter 6.2.1.), the analyses relevant for the teaching profession based on the non-clinical sample (part 2; see chapter 6.2.2.) and the additional clinical data available for the clinical data set (part 3; see chapter 6.2.3.). Finally, in the fourth part of the Results section, the findings revealed in previous sections are broaned

through the inclusion of additional analyses in both samples and, as a final step, they are all summarized in one model that aims at explaining the onset of stress (see chapter 6.2.4.).

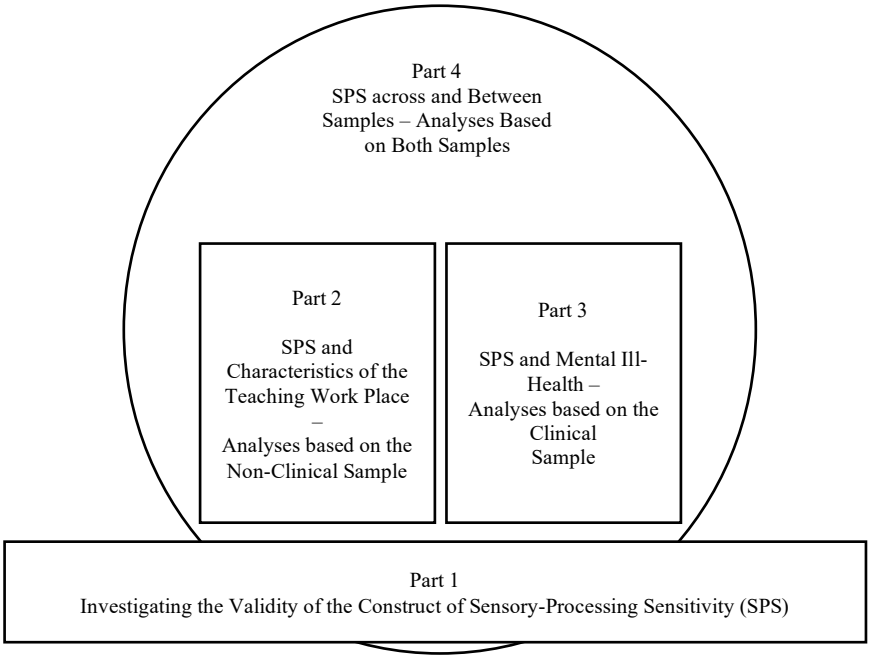

Figure 22. Overview of the study's four main areas of interest.

6.1. Preliminary Analyses and Results

Prior to conducting statistical analyses based on the main research questions and hypotheses, three research questions are answered as part of the preliminary analyses. Respective findings represent the basis for the upcoming analyses. First, both samples are compared with regard to variables of psychological well-being and the additional personal characteristics included in the present study. Second, the internal structure and validity of the newly developed scale measuring different characteristics of the teaching profession is investigated. Finally, differences between the two samples with regard to SPS are analyzed.

6.1.1. Comparing both samples on relevant psychological variables.

Based on previous results particularly in the field of teacher health (see chapter 4.5.), it is assumed that participants in the clinical sample apply more dysfunctional coping strategies, are more likely to have different dysfunctional cognitions, and reach higher scores on measures of well-being. As these assumptions are the foundation for all upcoming research questions as well, the difference had to be supported empirically for the present data set prior to conducting main analyses.

Research question 0.1: Can the differences between clinical and non-clinical data regarding variables of psychological well-being and other stress-relevant variables found in prior studies be replicated in the present study?

Hypothesis 0.1A: Participants in the clinical sample show significantly lower mean scores on the scale measuring work-life balance than the non-clinical sample.

Hypothesis 0.1B: Participants in the clinical sample show significantly lower mean scores on measures of self-efficacy than the non-clinical sample.

Hypothesis 0.1C: Participants in the clinical sample show significantly higher mean scores on measures of dysfunctional cognitions than the non-clinical sample.

Hypothesis 0.1D: Participants in the clinical sample show significantly higher mean scores on measures of coping strategies that are found to be dysfunctional (e.g., Social withdrawal) and lower mean scores on measures that are found to be functional (e.g., Relaxation) than the non-clinical sample.

Hypothesis 0.1E: Participants in the clinical sample show significantly higher mean scores on measures of psychological well-being than the non-clinical sample.

6.1.2. Exploring the internal structure of the scale measuring characteristics of the teaching profession.

Also, one focus of the present study is the effect of SPS on teachers' perception of their work place. In order to be able to measure those characteristics, a new scale was developed (see chapter 7.5.5.2.). This was realized based on theoretical assumptions about the work place of teachers, mainly those by Rothland (2013; see also chapter 2.2.1.2.). Because analyses on a scale level can only be conducted, if the scale's internal structure can be identified and empirically validated, a second step in the preliminary analyses is the investigation of the factorial structure of this measurement.

Research question 0.2: How many factors can be extracted when including all items of the newly developed instrument measuring specific workplace characteristics into one analysis?

6.1.3. Comparing both samples regarding sensory-processing sensitivity.

Because SPS represents the focus of the present study, the two samples are compared to each other with regard to their scores on the 12 items of the shortened HSP scale applied in the

present study as well at this point. Given the relationship with negative affect that has been found repeatedly (see chapter 3.7.), this first overview could give a first insight into a possible moderating role of psychological well-being on the relationship between SPS and other variables that are of interest in the upcoming chapters.

Research question 0.3: How do the two samples differ regarding their scores on the scale measuring SPS?

6.2. Main Analyses and Results

After preliminary results are obtained, the main analyses can be conducted. In the following paragraphs, these main analyses are divided into four more general parts, each focusing on one specific goal and sample, as described above. For each section, specific research questions and hypotheses are introduced and stated, underpinned with the respective theoretical basis.

6.2.1. Part 1: Investigating the validity of sensory-processing sensitivity.

The first part of research questions and hypotheses aim at supporting already existing findings with regard to the construct's validity, which has been investigated repeatedly in the scientific literature (see chapter 3.3.2.). It represents the foundation for further analyses and is colored in orange (Figure 23).

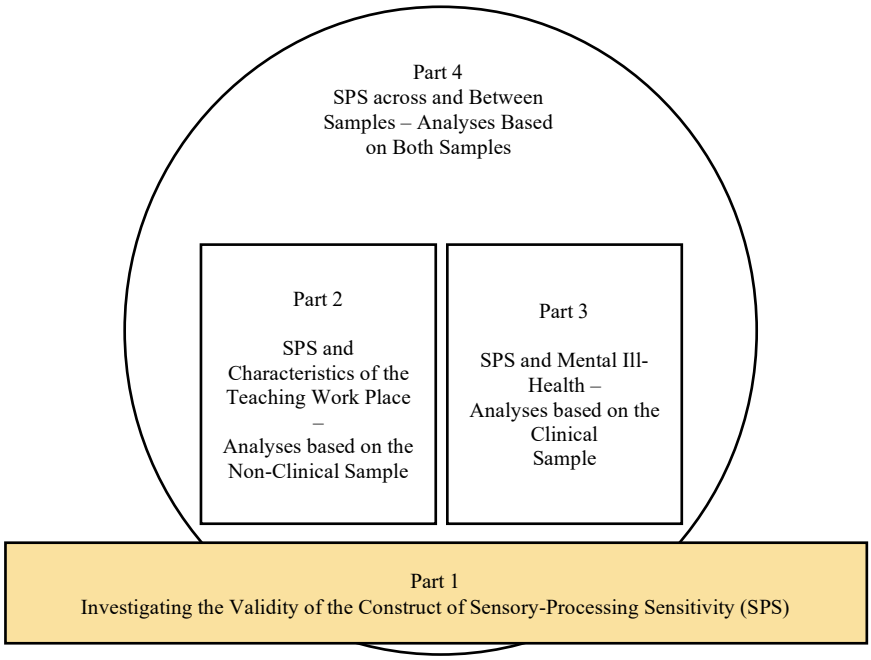

Figure 23. Overview of the study's four main areas of interest. Colored aspect represents the focus of the upcoming chapter.

6.2.1.1. Sensory-processing sensitivity and its association with measures of psychological well-being.

The first three research questions aim at replicating and further exploring existing findings (see chapter 3.3.2.) with regard to the relationship between SPS and measures of psychological well-being, which in this study include Depression, Anxiety, and Stress. One goal of these research questions is to further analyze possible construct overlaps. It also helps to inform how to take this relationship into account in further analyses. Based on already existing findings, the following four directed hypotheses were generated.

Research question 1.1: How does SPS relate to measures of psychological well-being (i.e., Depression, Anxiety, Stress) in each sample?

Hypothesis 1.1A: There is a significant medium positive relationship between SPS and Depression in each sample.

Hypothesis 1.1B: There is a significant medium positive relationship between SPS and Anxiety in each sample.

Hypothesis 1.1C: There is a significant medium positive relationship between SPS and Stress in each sample.

6.2.1.2. Investigation of variance explained across sensory-processing sensitivity and variables of psychological well-being.

While the first research question's aim was the replication of findings, the second and third research questions aim at a further exploring the relationship and particularly the effect of one variable on another. Specifically, the variance explained within measures of psychological well-being and within the variable is the focus of these analyses. The data basis for these questions were both samples separately. Because these relationships have not been investigated yet using these specific measures, the following statements are phrased as exploratory research questions rather than directed hypotheses.

Research question 1.2: How much variance within measures of psychological well-being (i.e., Depression, Anxiety, and Stress) is explained by SPS in each sample?

Research question 1.2A: How much variance within the measurement of Depression can be explained by SPS in each sample?

Research question 1.2B: How much variance within the measurement of Anxiety can be explained by SPS in each sample?

Research question 1.2C: How much variance within the measurement of Stress can be explained by SPS in each sample?

Research question 1.3: How much variance within SPS can be explained by measures of psychological well-being (i.e., Depression, Anxiety, Stress) in each sample?

6.2.1.3. Confirmatory support of the differentiation of the three measures of psychological well-being and sensory-processing sensitivity.

The fourth research question in this part of the analyses seeks to investigate possible construct overlaps. In particular, it was tested whether SPS and the three variables of psychological well-being (i.e., Depression, Anxiety, and Stress) are separable using statistical methods. Results could further support the construct's validity and would point against a possible construct overlap. In order to investigate the relationship using this approach, a confirmatory factor model was first tested, which would include all four variables in a non-orthogonal way, supporting that they are somehow related. In a second step, an exploratory factor analysis is applied as well. If the confirmatory model fit the data well, the results should be the same. However, if the confirmatory model did not fit, this approach offers a different way to investigate the factorial structure of the data of the present data set. Furthermore, the specific results are investigated and analyzed in more detail, also focusing on the question of whether different facets (or factors) of SPS might already be represented in these results. After applying these analyses to the non-clinical sample, the last specific research question as part of research question 1.4 is to also analyze the clinical sample in an exploratory way. Since this is a new approach to the analysis of the construct's validity as well, most of the respective research questions are phrased as exploratory questions rather than specific hypotheses.

Research question 1.4: Can the four measurement scales be supported in the present study using confirmatory factor analysis (in the non-clinical sample)?

Hypothesis 1.4A: A confirmatory factor analysis reveals statistical support for the fitting of the 4-factor model of the variables of Depression, Anxiety, Stress, and SPS.

Research question 1.4B: How many factors can be extracted when including Depression, Anxiety, Stress, and SPS into an exploratory factor analysis (with related factors)?

Research question 1.4C: Can the different facets (i.e., factors) of SPS already be represented in the results of the exploratory factor analysis?

Research question 1.4D: Based on the clinical sample, can the exploratory factor analysis also reveal four independent factors that would represent the four different constructs (i.e., SPS, Depression, Anxiety, and Stress)?

6.2.1.4. Confirming the factorial structure within the measure of sensory-processing sensitivity.

A fifth goal with regard to the investigation of the construct's validity is the replication of its factorial structures. While most prior studies investigated the internal structure of the trait using different numbers of factors, not considering a possible general facet of SPS as well, a bifactorial solution was recently suggested. In particular, the study by Pluess and colleagues (2018) first aimed at investigating a structure that would allow items to load on separate factors, but at the same time also on a general factor. Due to the fact that this structure has not been tested or replicated based on German data sets yet, research question five aims at replicating these findings by comparing the traditional one- and three-factor solutions to the recently developed bifactorial model. This was done using all three samples (i.e., the clinical sample, the non-clinical sample, and the total sample). The focus on replication of the relatively new development within the field leads to the following question being followed by a specific hypothesis.

Research question 1.5: Can the recently established bifactorial structure of SPS be confirmed in the present data set based on the shortened HSP-scale?

Hypothesis 1.5A: The bifactor solution fits the data in the present data set better than the solution with only three factors or one factor.

6.2.1.5. Extracting different sensitivity groups.

Based on the assumption of normality of SPS scores, which has been found in many studies (see chapter 3.10.), it has been suggested recently that, using the approach of latent class analysis, people can be assigned to three groups called sensitivity groups, which all differ with regard to their scores on the HSP scale. The following research questions and hypotheses aim at investigating whether these three sensitivity groups can be found in the present data set(s) as well. Furthermore, it is of interest to find the respective cut-off-scores (based on the respective

density plots) and compare them to those found in the study by Pluess and colleagues (2018). As the non-clinical sample represents the one that is likely to be closer to the population, the analyses are applied only to the non-clinical sample and subsequently transferred to the clinical sample.

Similar to question 1.5, this question aims at replicating already existing findings, leading to the fact that the specific statistical methods and thresholds from the original study are also applied in the replication. In order to be able to compare findings of the present study with those reported in the study by Pluess and colleagues (2018), the following requirements are set.

- The result with three groups should fit the present data the best, compared to a model with two groups;
- fit indices used to evaluate the fit are AIC, BIC, Sample-size adj. BIC, LMR-A (with respective p-value) and entropy;
- the three groups should show the following already published distributions: 24.67%-31.27% of participants are in group one with low scores on SPS (i.e., low sensitive group), 41.24%-42.15% of participants should be in the second group (i.e., medium sensitive group) and 26.58%-34.08% of participants should be in the group three with high SPS-mean values;
- the cut-off score between the low sensitive group and the medium sensitive group should be between 3.64 and 4.17, the cut-off-score between the medium sensitive group and the high sensitive group between 4.65 and 4.75;
- the mean on the SPS scale in the first group should be between 3.05 and 3.15 with standard deviations between .45 and .46; the second group should reveal mean scores between 4.04 and 4.23 with standard deviations between .33 and .35; the third group should have a grand mean of between 4.99 and 5.10 with standard deviations between .39 and .45.

However, for all scores above, it is important to note the fact that those studies were conducted using a 7-point Likert scale. They therefore cannot be transferred directly and have to be adjusted (as the present study applied a 5-point Likert scale). In the present study, this adjustment was realized using the percentage values of the mean (i.e., by dividing the respective mean values by the numbers of points of the Likert scale).

Research Question 1.6: Can the three independent groups of people that differ with regard to their level of SPS be replicated in the present study?

Hypothesis 1.6A: The results suggest a three-group solution based on the shortened HSP-scale to fit the present data (based on both samples individually) better than the solution with one, two, or four groups.

6.2.1.6. Investigating cut-off scores for the revealed sensitivity groups.

Pluess and colleagues (2018) have also suggested creating the three sensitivity groups (and assigning participants to these groups) based on a more theoretical approach, which included setting the cut-off scores in a way that the two extreme groups (i.e., the high sensitive group and the low sensitive group) each include 30% of the total sample. Independent of the results of the previous research question, this approach is also applied in the present study (i.e., based on the non-clinical sample). As the resulting three groups are assumed to differ significantly with regard to their mean scores on the HSP scale as well as on the individual items, two of the upcoming research questions also investigated this difference as a further validation of this approach.

Research question 1.6B: What are the cut-off-scores of the resulting model?

Research question 1.6C: Which cut-off-scores can be revealed when considering the suggested 30/40/30 approach to create three different sensitivity groups?

Research question 1.6D: Do the resulting three sensitivity groups differ significantly regarding their overall HSP mean scores?

Research question 1.6E: Do the resulting three sensitivity groups differ significantly regarding their scores on all 12 items of the shortened HSP scale?

6.2.1.7. Transferring the cut-off scores to the clinical sample.

As all the aforementioned analyses were realized based on the non-clinical sample (representing the population more accurately than the clinical sample), the last three specific research questions aim at transferring these cut-off scores to the clinical sample and investigating the specific distribution across the three sensitivity groups and whether they differ significantly from each other on the mean score on the total HSP scale as well as on their scores on the 12 individual items of the scale.

Research question 1.6F: When applying these cut-off-scores to the clinical sample, what does the resulting distribution look like?

Research question 1.6G: Do the three sensitivity groups in the clinical sample differ regarding their overall HSP mean scores?

Research question 1.6H: Do the resulting three sensitivity groups differ significantly regarding their scores on all 12 items of the shortened HSP scale when analyzing the clinical sample?

The results of the aforementioned research questions and hypotheses represent the foundation for upcoming analyses, particularly with regard to the sensitivity groups. As a comparison of sensitivity groups will be part of numerous following research questions, further proceedings will be decided on based on the respective results of the aforementioned research questions.

6.2.2. Part 2: Sensory-processing sensitivity and the teaching workplace – analyses based on the non-clinical data set.

This second part of the Results section aims at investigating the role of SPS in the teaching work place (i.e., orange parts in Figure 24 below). The findings revealed based on the research questions stated in chapter 6.2.1 represent the basis for the upcoming larger research questions. In particular, this includes the relationship between SPS and different characteristics of teachers' work place (some of which were developed for this study), their perceived performance (and the effect of psychological well-being on this relationship), forms and perceived benefits of collaboration as well as the mediating role of SPS in teacher stress.

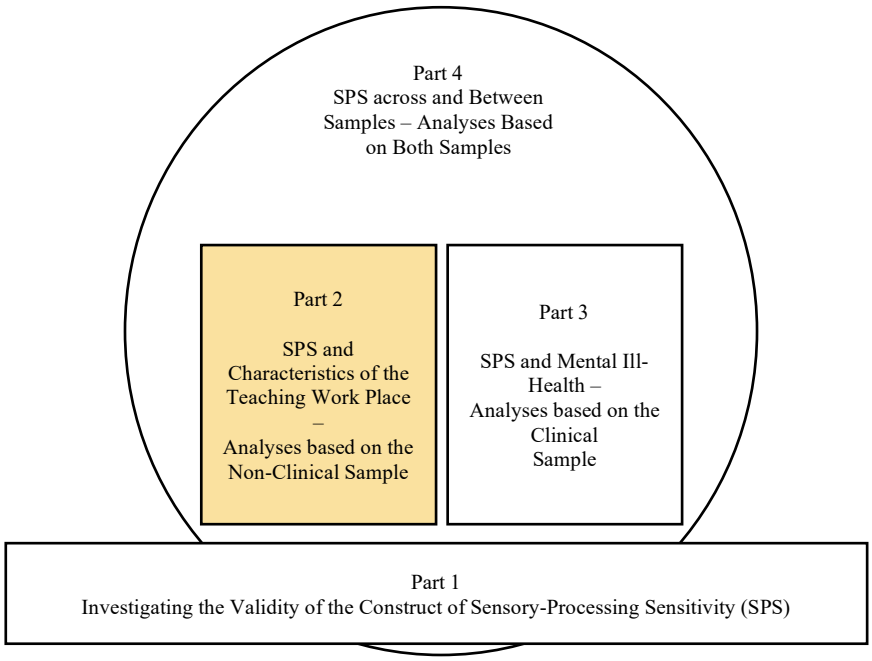

Figure 24. Overview of the study's four main areas of interest. Colored aspect represents the focus of the upcoming chapter.

6.2.2.1. Investigating the internal structure of the newly developed scale connecting sensory-processing sensitivity with aspects of the teaching profession.

As was already described, three newly developed scales were included in the present study. While the scale measuring different characteristics of the teaching profession is already investigated as part of the preliminary analyses above (see chapter 6.1.), the two remaining newly developed scales are the focus of the upcoming first two research questions in this second part of the research questions. First, the factorial structure of the items that are assumed to connect SPS and the teaching profession is investigated in a confirmatory and subsequently exploratory way. This procedure is chosen, because an exploratory analysis can obtain more detailed information about the underlying data structure, which is particularly important when investigating a scale that has not been validated before. A statistical comparison of these particular variables between the three sensitivity groups is subsequently applied to further validate the findings. Because of the fact that this scale was specifically developed for this present study, the approach followed in this first research question is exploratory in nature. Therefore, instead of directed hypotheses, research questions are stated. One exception is the hypothesis 2.1D. Given that the scale was developed having the specific characteristics of HSPs in mind, it is assumed that participants with higher levels of SPS show these characteristics in the teaching workplace as well.

Research question 2.1: Can the theoretically hypothesized internal structure of the scale connecting sensitivity and workplace characteristics be supported in the present (non-clinical) data set?

Hypothesis 2.1A: The fit indices of a confirmatory factor analysis support the hypothesized structure with two sub-scales focusing on teachers' Perceived attunement to students and Deeper processing of teaching-related aspects.

Research question 2.1B: How many factors can be extracted (based on exploratory analyses) based on the newly developed items measuring teachers' perceived attunement to students and deeper processing of teaching-related aspects?

Research question 2.1C: How strongly is SPS correlated with these two factors and the individual items?

Hypothesis 2.1D: Compared to the Low and medium sensitive group, participants in the high sensitive group report higher scores on average on the items originally assumed to measure attunement to students.

Research question 2.1E: Compared to the other groups, participants in the high sensitive group report higher scores on average on the items originally assumed to measure aspects of deeper information processing.

6.2.2.2. Perceived performance, the distribution across sensitivity groups, and the moderating role of strain.

In a second step, the scale measuring teachers' perceived performance is further validated as part of the second research question. Subsequently to investigating the difference between the three resulting sensitivity groups with regard to teachers' perceived performance, it is further assumed that perceived strain can affect the perception of one's own performance in a negative way, particularly for people with higher levels of SPS. The underlying process is assumed to be as follows: In stressful situations, HSPs might feel overwhelmed and, consequently, more critical with regard to their own performance. This association is assumed to be elevated if the stress level increases (A. Aron, personal communication, May 10, 2016). Therefore, it was also of interest whether strain might moderate the relationship between SPS and perceived performance. This moderation analysis was applied twice, at first with the total non-clinical sample, followed by the analysis based on data from the high sensitive group only.

Research question 2.2: How is perceived performance distributed across the three sensitivity groups and what role does perceived stress play?

Research question 2.2A: Do the three sensitivity groups differ with regard to teachers' perceived performance?

Research question 2.2B: Does decreased psychological well-being (i.e., operationalized using Depression, Anxiety, and Stress in the present study) moderate the relationship between SPS and perceived performance?

Research question 2.2C: Does decreased psychological well-being (i.e., operationalized using Depression, Anxiety, and Stress in the present study) moderate the relationship between SPS and perceived performance when only taking into account the high sensitive group in the non-clinical sample?

6.2.2.3. Associations between sensory-processing sensitivity and different characteristics of the teaching workplace and differences between sensitivity groups based on the scale level.

One additional main focus of this study is to further investigate whether the different sensitivity groups, and therefore people with different levels of sensitivity, perceive certain characteristics of the teaching profession differently (see chapter 5.1.). In order to do so, some exploratory Analyses of Variance (ANOVA; as well as the non-parametric alternative) were conducted on the basis of factors that have been found in the present data set (for more details on the different resulting factors of this newly developed scale, see chapter 8.1.2.). The upcoming specific associations and differences of interest are based on assumptions made based on the characteristics of HSPs. Those are:

- Due to their increased information processing, it is assumed that HSPs have difficulties disconnecting from work when they are at home or doing other activities. This would apply to the sub-scale Balance between work and personal life and the established scale measuring work-life balance.
- In line with the first aspect is the assumption that HSPs might have particular difficulties deciding when they should stop doing a specific task because they would consider more details and important aspects that are missing or can still be realized.
- Based on the assumption that HSPs are very empathetic and caring, it is assumed that they would feel more strongly connected to students and perceive a stronger relationship as well. However, due to this characteristic being combined with deeper information processing, it might also be difficult for HSPs to feel that they fulfill the needs of all students during teaching.

For all the facets that are not included in the list above, no specific assumptions are available and are phrased as research questions rather than specific hypotheses.

Research question 2.3: How is SPS related with specific characteristics of the teaching profession and how do the sensitivity groups differ in this regard?

Hypothesis 2.3A: On average, teachers in the high sensitive group report higher scores on the sub-scale Balance between work and personal life than the other two groups.

Hypothesis 2.3B: On average, teachers in the high sensitive group report higher scores on the sub-scale Lack of task completion than the other two groups.

Research question 2.3C: On average, do teachers in the high sensitive group report higher scores on the sub-scale Educational freedom than the other two groups?

Hypothesis 2.3D: On average, teachers in the high sensitive group report higher scores on the sub-scale Relationship with students than the other two groups.

Hypothesis 2.3E: On average, teachers in the high sensitive group report lower scores on the scale measuring work-life balance than the other two groups.

Research question 2.3F: On average, do teachers in the high sensitive group report higher scores on the scale measuring Lack of feedback than the other two groups?

6.2.2.4. Associations between sensory-processing sensitivity and different characteristics of the teaching work place and differences between sensitivity groups based on the level of individual items.

In a second step, it is of interest how the three sensitivity groups differ with regard to the characteristics of the teaching profession on the basis of individual items. In particular, it is assumed to gain more insight into the role of SPS in the teaching workplace by also investigating associations and differences on the level of individual items. In particular, by applying these analyses, the unclear and non-acceptable results found in the previous analysis can be addressed and included in the analysis anyway.

Research question 2.4: Can exploratory analyses based on the item-level reveal further associations with SPS and differences between the three groups?

Work-life balance due to two workplaces

Hypothesis 2.4A: On average, teachers in the high sensitive group report higher scores on the item “I find it difficult to separate work and private life” than the other two groups.

Hypothesis 2.4B: On average, teachers in the high sensitive group report lower scores on the item “I succeed in separating work and private life” than the other two groups.

Openness of tasks / lack of task completion and time management

Hypothesis 2.4C: On average, teachers in the high sensitive group report higher scores on the item “I find it difficult to estimate when my personal efforts and my engagement suffice” than the other two groups.

Hypothesis 2.4D: On average, teachers in the high sensitive group report higher scores on the item “I could always do more” than the other two groups.

Work with and influence on students

Hypothesis 2.4E: On average, teachers in the high sensitive group report higher scores on the item “I find it hard to estimate what students need” than the other two groups.

Hypothesis 2.4F: On average, teachers in the high sensitive group report higher scores on the item “I find it almost impossible to meet the needs of all students” than the other two groups.

Hypothesis 2.4G: On average, teachers in the high sensitive group report higher scores on the item “As a teacher I have great influence on students’ performance” than the other two groups.

Lack of feedback

Research question 2.4H: On average, do teachers in the high sensitive group report higher scores on the item “I miss feedback about long-term effects of my teaching” than do the other two groups?

Research question 2.4I: On average, do teachers in the high sensitive group report higher scores on the item “I miss positive feedback from students” than do the other two groups?

Research question 2.4J: On average, do teachers in the high sensitive group report higher scores on the item “I miss positive feedback from parents” than do the other two groups?

Exceeding (collaboration) efforts

Research question 2.4K: On average, do teachers in the high sensitive group report higher scores on the item “My profession includes engagement more than the regular extent (e.g., in projects, youth hostels, etc.)” than do the other two groups?

Research question 2.4L: On average, so teachers in the high sensitive group report higher scores on the item “School is not just a workplace for me” than do the other two groups?

Collaboration with other people

Research question 2.5M: On average, do teachers in the high sensitive group report lower scores on the item “Collaboration with some people is difficult” than do the other two groups?

Research question 2.5N: On average, do teachers in the high sensitive group report lower scores on the item “I cannot chose who I work with” than do the other two groups?

Research question 2.5O: On average, do teachers in the high sensitive group report lower scores on the item “Other people judge about the teaching profession, because they have visited as school themselves” than do the other two groups?
Research question 2.5P: On average, do teachers in the high sensitive group report lower scores on the item “All people think they can join in a conversation about the teaching profession” than do the other two groups?

6.2.2.5. Sensory-processing sensitivity and aspects of expectations.

In order to offer a comprehensive overview of associations between SPS and certain characteristics of the teaching workplace, the newly developed scale measuring expectations toward teachers is included in the analyses as well. As was the case with some specific characteristics, it is assumed that HSPs might perceive various expectations more intensely and also consider those more due to the fact that they process information more deeply.

Research question 2.5: How is SPS associated with the overall scale measuring expectations towards teachers and the individual items?

Hypothesis 2.5A: On average, there is a significant positive association between SPS and the overall scale measuring Expectations toward teachers as well as the individual items.
Hypothesis 2.6B: On average, the high sensitive group reaches higher scores than participants in the remaining two sensitivity groups on the general scale and across individual items.

6.2.2.6. Characteristics of teachers’ wor place, perceived strain and the mediating role of sensory-processing sensitivity.

Based on the previously described assumption that HSPs might have more difficulties with regard to certain characteristics of the teaching work place and the related results, it is assumed that this association might be one way to explain how those characteristics are associated with perceived strain. Therefore, the goal of this upcoming section is to analyze whether level of SPS might be able to explain the relationship between certain workplace characteristics and teachers’ perceived strain.

Research question 2.6: Does SPS mediate the relationship between work-life balance and stress?

Research question 2.6A: Does SPS mediate the relationship between work-life balance (i.e., as measured with the scale by Syrek et al., 2011) and Stress?
Research question 2.6B: Does SPS mediate the relationship between Work-life balance (i.e., as measured with the self-developed scale based on descriptions by Rothland (2013)) and Stress?
Research question 2.6C: Does SPS mediate the relationship between Openness of tasks / Lack of task completion (i.e., as measured with the self-developed scale based on descriptions by Rothland (2013)) and Stress?
Research question 2.6D: Does SPS mediate the relationship between expectations towards teachers (i.e., as measured with the self-developed scale based on descriptions by Rothland (2013)) and Stress?

6.2.2.7. Sensory-processing sensitivity and aspects of collaboration.

In particular with regard to societal changes, such as the introduction of inclusion and inclusive classrooms or migration processes, all leading to an increase in students' heterogeneity, collaboration between teachers represents an important task in everyday school life (see chapter 2.2.1.2.). Although the different characteristics of people with high levels of SPS (see chapter 3.1.) might lead to an assumption that HSPs might not like to collaborate, there are no findings supporting this assumption. Based on this lack of research and research findings, this question is analyzed in an exploratory approach in the present study. As was the case in some research questions above, at first, relationships between forms (i.e., the application of these forms in everyday school life) of collaboration as well as teachers' perceived benefit of collaboration and SPS are applied. These relationships are further validated by comparing the three sensitivity groups on those forms and perceived benefits of collaboration that are found to be related to SPS.

Research question 2.7: How does SPS relate to forms of and teachers' perceived benefits from collaboration?

Research question 2.7A: Can significant relationships between SPS and the different forms of collaboration be found?
Research question 2.7B: Can significant relationships between SPS and the different perceived benefits from collaboration be found?

Research question 2.7C: Do the three sensitivity groups differ regarding the aforementioned forms of and perceived benefits from collaboration that revealed a significant relationship with SPS?

6.2.3. Part 3: Sensory-processing sensitivity and mental ill-health – analyses based on the clinical data set.

The goal of this section is to further analyze characteristics of the clinical sample. In particular, it aims at answering the how SPS relates to the additional clinical variables collected. Furthermore, it is of interest whether a relationship between sensitivity group and previous treatment can be identified, whether SPS relates to specific main and secondary diagnoses as well as if findings in line with the theory of vantage sensitivity can be generated in the present study. Based on the graphical depiction of the content of the present study, the upcoming chapter aims at investigating SPS within a clinical context (i.e., the aspect colored in orange in Figure 25).

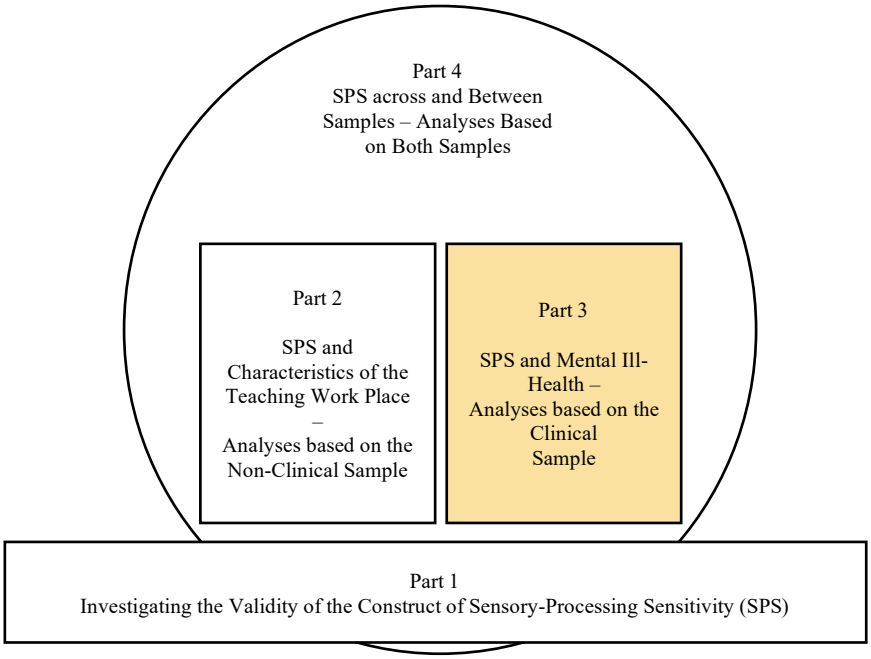

Figure 25. Overview of the study's four main areas of interest. Colored aspect represents the focus of the upcoming chapter.

6.2.3.1. Sensory-processing sensitivity and additional clinical variables.

As more variables and data were made available by the clinic for part of the clinical data (for more detailed information about the specific measures available, see chapter 7.5.7.), it was of interest how SPS relates to these additional clinical variables. Because SPS has never been

analyzed in a structured way within the clinical context (see chapter 5.2.), the analyses are exploratory in nature and therefore phrased as research questions. However, there is one exception to this gap of research: The Brief Symptom Inventory (BSI) has already been analyzed with regard to SPS by Konrad and Herzberg (2017). However, because this previous analysis was conducted based on a non-clinical sample and the present study includes a clinical sample, the results might still differ significantly. Therefore, the analysis does not represent a replication and related questions are phrased as research questions rather than hypotheses in the upcoming section.

Research question 3.1: How does SPS relate to the additional variables (i.e., scales common in the psychiatric field and length of stay) measured in the clinical sample?

Research question 3.1A: How does SPS relate to the length of patients' incapacity for work in the 12 months prior to admission (in weeks)?

Research question 3.1B: How does SPS relate to patients' sum scores on the GAF scale (Global assessment of functioning) the last two months before admission and at release?

Research question 3.1C: How does SPS relate to patients' mean scores on the sub-scales of the BSI (Brief Symptom Inventory; i.e., Somatization, Obsessive compulsion, Interpersonal sensitivity, Depression, Anxiety, Hostility, Phobic anxiety, Paranoid ideation, Psychoticism) as well as the three global scores (Global severity index, Positive symptom distress index, Positive symptom total) at admission and release?

Research question 3.1D: How does SPS relate to patients' sum scores on the sub-scales of the PHQ (Patient Health Questionnaire; i.e., Somatoform disorder, Depressive disorder, Anxiety disorder) at admission and release?

Research question 3.1E: How does SPS relate to patients' duration of treatment?

6.2.3.2. Validation of relationships between sensory-processing sensitivity and additional clinical variables through comparisons between sensitivity groups.

As was the case for certain analyses above already, some results are further validated by investigating differences between the three sensitivity groups. In this case and the upcoming Research question 3.3, this approach is also applied. However, in order to keep results concise, only those variables are analyzed that revealed a significant correlation coefficient in prior analyses.

Research question 3.2: Based on the significant relationships revealed in research question 3.1, do the three sensitivity groups differ on those variables (i.e., scales common in the psychiatric field and length of stay) as well?

6.2.3.3. Sensitivity groups and their difference regarding previous treatment.

Data on whether patients received treatment prior to the stay at the psychosomatic clinic were available for some patients. Although there is evidence for the fact that people with higher levels of SPS might be overwhelmed more easily than people with lower levels, which in turn leads to a higher risk of becoming (psychologically) ill and, consequently, being in need for psychological and therapeutic treatment, no data were available in the research field on SPS that could lead to any hypothesis on whether being part of a certain sensitivity group might be related to whether people have had previous treatments or not. Therefore, similar to the previous research questions, the upcoming is also phrased as a rather exploratory research question.

Research question 3.3: Does a relationship between sensitivity group and whether patients received outpatient treatment before admission to the clinic exist? How does the result change when only considering psychiatric outpatient treatment?

6.2.3.4. Sensitivity groups and severity of psychological strain (based on the BSI).

Following the investigation of the relationship between SPS and additional psychiatric and psychological measurements as part of Research question 3.2 already, the upcoming research question offers an alternative approach to this question. Based on data from the Brief Symptoms Inventory (BSI; for more information on this scale, see chapter 7.5.7.4.), which captures a wide range of difficulties, sensitivity groups are compared with regard to the dichotomization of T-scores on all sub-scales. In particular, it is of interest in the upcoming section whether there is a relationship between sensitivity group and the number of people who reached T-scores above the threshold of 63, indicating severity of a specific aspect of functioning. With regard to the same research question, Konrad and Herzberg (2017) included a comparison of two sensitivity groups (i.e., HSPs and non-HSPs) using the Kolmogorov-Smirnov test in their study. However, it is important to note at this point that the two groups were created based on a different scale measuring SPS and also a different approach. In particular, they applied the 80th percentile as the HSP group and did so separately for men and women. Given these differences in the

conceptual basis between the previous and the present study, the research question is, again, seen as exploratory and therefore phrased as a question rather than a hypothesis.

Research question 3.4: Is there a relationship between the respective sensitivity group and patients who reached a T-score that was bigger than 63 on any of the BSI sub-scales at admission and/or upon release?

6.2.3.5. Sensitivity groups and patients' main and secondary diagnoses.

Two additional aspects that are available for part of the clinical sample are main and secondary diagnoses. Based on these data and initial findings through previous analyses (with regard to which disorders SPS might be associated mostly), it is of further interest if there is a relationship between assignment to a specific sensitivity groups and certain diagnoses. Aiming at closing this significant research gap in the field of SPS research, the following research questions are posed.

Research question 3.5: How do the respective sensitivity groups relate to different main and secondary diagnoses?

Research question 3.5A: How do the respective sensitivity groups relate to different main diagnoses?

Research question 3.5B: How do the respective sensitivity groups relate to different secondary diagnoses?

6.2.3.6. Sensory-processing sensitivity and therapeutic success (based on the theory of vantage sensitivity).

In the literature on SPS and (psychological) well-being, the framework is often based on the diathesis-stress model and SPS is often seen as a vulnerability factor (see chapter 4.3.1.). This one-sided perspective has been highly criticized in recent years (see for example Pluess, 2015). However, a growing body of literature focuses more on the positive effects that can also be a result of higher levels of SPS (in line with the theories of differential susceptibility and vantage sensitivity; see chapters 3.9.1. and 3.9.3.). Those are very important to consider, too, given that SPS is not assumed to represent a mental illness or difficulty. Similarly, it is important to investigate the positive effects of SPS given that research based on this more positive perspective is relatively scarce. Based on this development in the field of SPS and the

importance of considering both sides of the trait, this aspect is also addressed in the present study. For some participants data at admission and upon release on additional clinical measurements are available, which make an analysis of the therapeutic success and how it relates to SPS and the sensitivity groups possible. Based on existing findings suggesting a greater effect of interventions and prevention programs for people with higher sensitivity levels (see chapter 3.7.), hypotheses could be phrased for each of the additional clinical measures. As was the case in numerous previous research questions already, different approaches to answering this question are applied. They include the investigation of relationships, differences between sensitivity groups, and the analyses of differences based on dichotomized scores.

Research question 3.6: How does SPS relate to therapy success and progress in the clinical sample (i.e., in line with the vantage sensitivity theory)?

Hypothesis 3.6A: SPS is significantly positively related to the difference in BDI-II scores between admission and release.

Hypothesis 3.6B: SPS is significantly positively related to the difference in GAF scores two months before admission and upon release.

Hypothesis 3.6C: SPS is significantly positively related to the difference in BSI-GSI scores between admission and release.

Hypothesis 3.6D: SPS is significantly positively related to the difference in T-scores on the BSI sub-scales between admission and release.

Hypothesis 3.6E: SPS is significantly positively related to the difference in sum scores on the PHQ sub-scales between admission and release.

Research question 3.6F: Can these findings revealed in hypothesis 3.6A to 3.6E be further supported when comparing the sensitivity groups as well?

Research question3.6G: Is there a relationship between CGI Improvement scores and membership in a sensitivity group?

Research question 3.6H: Is there a relationship between sensitivity group membership and the group of participants with high severity on the BSI sub-scales (as defined by T-scores > 63) at admission, but managed to stay below this threshold at release?

Research question 3.6I: Is there a relationship between sensitivity group membership and positive GAF difference scores?

Research question 3.6J: Considering only patients with high severity on the BSI sub-scales (as defined by a T-score above 63) with a significant correlation with SPS, do the sensitivity groups differ with regard to the difference scores?

6.2.3.7. Investigation of therapeutic success based on sensitivity groups revealed on the basis of the clinical sample.

In all the previous research questions and subsequent analyses in this section, the sensitivity groups in the clinical sample are created based on the cut-off scores found in the non-clinical sample. Consequently, in some cases (i.e., with regard to some variables and data available), the size of the sensitivity groups is very small and the distribution very uneven and not based on theoretical and empirical assumptions (i.e., based on the 30/40/30 distribution). It was therefore of interest whether the results in line with the theory of vantage sensitivity change if the sensitivity groups are created based on the theoretical distribution of the clinical sample itself. In order to answer this question, at first, new sensitivity groups are developed and some analyses of Research question 3.6 are conducted again based on the new sensitivity groups.

Research question 3.7: Could the theory of vantage sensitivity be supported by present data if the sensitivity groups are created in line with the theoretical distribution with 30% in the low sensitive group, 40% in the medium sensitive group and 30% in the high sensitive group as suggested by Pluess and colleagues (2018)?

Research question 3.7A: Do the newly created three sensitivity groups differ significantly regarding the difference between the BDI-II scores at admission and upon release?

Research question 3.7B: Do the newly created three sensitivity groups differ significantly regarding the difference between the GAF scores at admission and upon release?

Research question 3.7C: Do the newly created three sensitivity groups differ significantly regarding the difference in BSI T-scores at admission and upon release across all nine sub-scales and the GSI sub-scale?

Research question 3.7D: Do the newly created three sensitivity groups differ significantly regarding the difference in PHQ sum scores at admission and upon release across all three sub-scales?

Research question 3.7E: Is there a relationship between CGI Improvement scores and membership in a sensitivity group?

Research question 3.7F: Is there a relationship between the dichotomized BSI improvement score across all sub-scales and membership in a sensitivity group?

Research question 3.7G: Is there a relationship between the dichotomized GAF improvement score (between admission) and release and membership in a sensitivity group?

6.2.4. Part 4: Final analyses considering both samples.

This final section takes both samples into consideration, broadens existing findings and, finally summarizes theoretical models, previous findings and the findings of the present study into one overarching model (as depicted in Figure 26 below). In order to keep a concise overview over all areas of interest in this fourth section, they are further divided into four parts: Extending previous findings through by including possible mediating factors (i.e., Part 1), comparing sensitivity groups of both samples to each other on SPS and additional variables (i.e., Part 2), taking HSPs of both samples together and investigate possible sensitivity types (i.e., Part 3), and testing a final model of stress including SPS (i.e., Part 4).

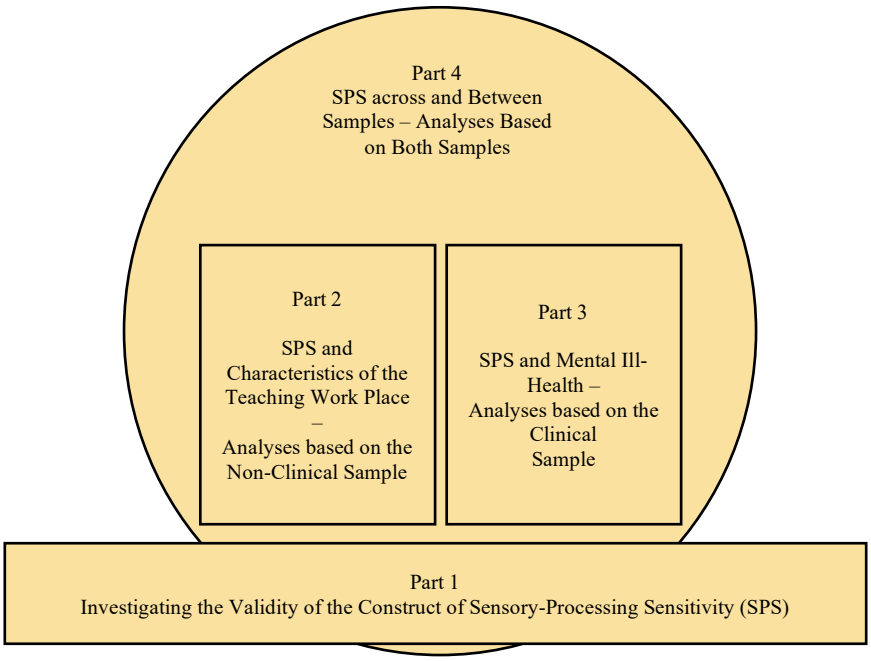

Figure 26. Overview of the study's four main areas of interest. Colored aspect represents the focus of the upcoming chapter.

6.2.4.1. Sensory-processing sensitivity and dysfunctional cognitions.

Dysfunctional cognitions are found to play an important role for the onset of psychological ill-health (see chapter 4.3.1.). In particular, Wyller and colleagues (2017) suggested the inclusion of the "concept of *cognitive reactivity*" (p. 4) into the field of research on SPS as one possible explanation for the underlying process leading to increased psychological distress (see chapter 3.7. for a more detailed description of the model). With this model, they refer back to models of depression, which have also been broached as part of the theoretical background of the present study (see chapter 4.3.1.2.) and which assume that "latent negative content and negative processing biases" (p. 4) are stimulated through cognitive reactivity. What is important in their model is the "bi-directional linked" (p. 5) process, which would lead to the assumption that the second part of the model, including thought content and processes, might be influenceable. One way to investigate the negative content and the processing bias is to investigate associations between SPS and certain dysfunctional cognitions. However, this has never been done before and represents a research gap the present study aims at closing. All six dysfunctional cognitions are included in the analyses as they all can reveal further insight into the underlying thought processes of HSPs. Given that no empirical evidence has been generated yet, all associations and differences are phrased as non-directed open research questions. Furthermore, similar to in previous analyses, the relationship with SPS is investigated in a first step before this association is subsequently validated by comparing the three sensitivity groups on the specific variables of interest (which in this case are only those that revealed a significant result).

Research question 4.1.: Can significant relationships between SPS and the different dysfunctional cognitions be found in each sample?

Research question 4.1A: Is SPS significantly related to the dysfunctional cognition Dependency in each sample?

Research question 4.1B: Is SPS significantly related to the dysfunctional cognition Perfectionism in each sample?

Research question 4.1C: Is SPS significantly related to the dysfunctional cognition Risk avoidance in each sample?

Research question 4.1D: Is SPS significantly related to the dysfunctional cognition Depreciation and failure in each sample?

Research question 4.1E: Is SPS significantly related to the dysfunctional cognition Avoidance of social support in each sample?

Research question 4.1F: Is SPS significantly related to the dysfunctional cognition Internalization of failure in each sample?

Research question 4.1G: Do the sensitivity groups differ significantly on the particular dysfunctional cognitions that showed a significant relationship with SPS in each sample?

6.2.4.2. Sensory-processing sensitivity and coping strategies across samples.

Similarly, coping strategies are found to play a significant role in stress and well-being, particularly for teachers (see chapter 4.5.1.). In addition to dysfunctional thought content and thought processes as described above (e.g., Wyller et al., 2017), it is also reasonable to believe that people with higher levels of SPS might also apply more dysfunctional coping strategies in situations in which they perceive stress. Although empirical evidence has not been generated in line with this assumption, certain characteristics of HSPs, such as the need for time alone in order to process certain experiences and (see chapter 3.1. for more characteristics with regard to SPS), justify the hypotheses and more general research questions stated below. Although the one existing study on highly sensitive teachers investigated certain coping strategies with regard to everyday life as a teacher (Stefan Lindsay, 2017) most of them were not comparable to those included in the present study. While based on the known characteristics of HSPs, a directive hypothesis can be stated for strategies like resignation or social withdrawal, no suggestions for specific associations can be made for the remaining strategies. Therefore, as was the case for some research questions above, some of the upcoming analyses of interest are phrased as more general, overarching research questions rather than hypotheses.

Research question 4.2: Can significant relationships between SPS and the different coping strategies be found in each sample?

Hypothesis 4.2A: SPS is significantly positively related to the coping strategy Resignation in each sample.

Research question 4.2B: Is SPS significantly related to the coping strategy Relaxation in each sample?

Research question 4.2C: Is SPS significantly related to the coping strategy Exploration of positive experiences in each sample?

Hypothesis 4.2D: SPS is significantly positively related to the coping strategy Social withdrawal in each sample.

Research question 4.2E: Is SPS significantly related to the coping strategy Proactive problem solving in each sample?

Research question 4.2F: Is SPS significantly related to the coping strategy Control of reaction in each sample?

Research question 4.2G: Do the three sensitivity groups differ significantly on the particular coping strategies that showed a significant relationship with SPS in each sample?

6.2.4.3. Sensory-processing sensitivity and self-efficacy across samples.

Self-efficacy has been found to play an important role with regard to teachers' psychological well-being and contentment (e.g., Skaalvik & Skaalvik, 2007). Furthermore, it has been suggested that people's emotions also influence senses of self-efficacy and, consequently, satisfaction at work (e.g., Evers et al., 2008). However, in the previous study with SPS and teachers, self-efficacy and SPS were not found to be significantly related to each other. This present study aims at investigating whether this lack of significant results is also found based on the teacher data set in the present study. Furthermore, as was the case in previous research questions, the results are validated again by statistically comparing the three sensitivity groups on this variable again.

Research question 4.3: How is SPS related to self-efficacy in each sample?

Hypothesis 4.3A: SPS is not significantly related to self-efficacy.

Research question 4.3B: Do the sensitivity groups differ significantly regarding self-efficacy?

PART 2 – Comparing the sensitivity groups of both samples with regard to SPS and additional variables

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6.2.4.4. Comparison of all six final sensitivity groups across both samples.

While a first overview of the differences between the two samples with regard to SPS has already been provided in the preliminary analysis (see section 6.1.3.), more detailed insight into the differences is the goal of this chapter. In particular, the different levels of SPS (i.e., represented by the specific sensitivity groups of both samples) are also considered in this upcoming group of research questions. Furthermore, it is investigated whether these groups still

differ from each other when also taking into account the aspect of negative affect, standing for the main difference between these two samples. These two main goals are represented in the following research questions.

Research question 4.4: How do the six sensitivity groups across both samples differ with regard to SPS?

Research question 4.4A: Do all six sensitivity groups differ regarding their SPS mean scores?

Research question 4.4B: Do all six sensitivity groups differ regarding their SPS mean scores when controlling for variables of negative affect (i.e., Depression, Anxiety, and Stress)?

Research question 4.4B-1: Do all six sensitivity groups differ regarding their SPS mean scores when controlling for Depression?

Research question 4.4B-2: Do all six sensitivity groups differ regarding their SPS mean scores when controlling for Anxiety?

Research question 4.4B-3: Do all six sensitivity groups differ with regarding their SPS mean scores when controlling for Stress?

6.2.4.5. Sensitivity groups of both samples and their differences regarding personal characteristics related to psychological well-being.

In addition to the differences with regard to the SPS mean scores, it is also of interest whether these six resulting sensitivity groups differ with regard to other personal characteristics that are found to be related to psychological well-being. In this particular section, those characteristics of interest are dysfunctional cognitions, coping strategies, and self-efficacy.

Research question 4.5: How do the two high sensitive groups (of both samples) differ on measures of psychological ill-health as well as personality-related characteristics that are assumed to be associated with psychological well-being (i.e., dysfunctional cognitions, coping strategies, and self-efficacy)?

Research question 4.5A: How do the two high sensitive groups (of both samples) differ regarding variables of psychological ill-health?

Research question 4.5B: How do the two high sensitive groups (of both samples) differ regarding personal characteristics that are assumed be associated with psychological well-being?

Research question 4.5C: How do the two high sensitive groups (of both samples) differ regarding the perception of certain work place characteristics of teachers?

PART 3 – Taking HSPs of both samples together and investigating possible sensitivity types

6.2.4.6. Investigation of different sensitivity types.

When investigating SPS it is important to not assume all HSPs to be the same. The fact that HSPs differ significantly from each other is already indicated by the different facets of SPS that have been found repeatedly (see chapter 3.3.2.). Based on the assumption that people high on SPS might also differ with regard to the certain aspects that in general make up SPS assumptions of the existence of different sensitivity types have been suggested recently (P. Wyrsch, personal communication, September 19, 2018). The upcoming section aims at investigating possible sensitivity types and whether they might differ with regard to the additional personal characteristics as well as their perception of certain workplace characteristics. Furthermore, it has even been hypothesized that items making up the facet Aesthetic sensitivity might possibly act as indicators for the positive aspect of SPS (i.e., as focused in the theory of vantage sensitivity; see chapter 3.9.3.). In the present study those might represent protective aspects and indicators for therapeutic success. In order to further analyze this, an additional research question focusing on therapeutic success is added in the upcoming section as well.

Research question 4.6: Can different sensitivity types be found when taking the high sensitive groups of both samples together?

Research question 4.6A: How are the two samples distributed across the resulting clusters?

Research question 4.6B: What are the specific characteristics of the resulting clusters?

Research question 4.6C: Do HSPs in the resulting clusters differ with regard to the perception of certain work place characteristics?

Research question 4.6D: Do HSPs in the resulting clusters differ regarding certain possible psychological variables related the onset of stress (i.e., dysfunctional cognitions, coping strategies, and self-efficacy)?

Research question 4.6E: Do HSPs in the resulting clusters differ regarding the newly developed items that are assumed to connect SPS and the teaching profession?

Research question 4.6F: Do HSPs in the resulting clusters differ regarding therapeutic success from a perspective of the theory of vantage sensitivity?

PART 4 – Testing a final model of stress including SPS

6.2.4.7. Developing an overarching final model for the onset of psychological ill-health in teachers including sensory-processing sensitivity.

In this final section, an overarching model is ought to be developed. This is realized by taking theoretical assumptions and models, existing empirical findings and the findings of the present study (i.e., with a focus on SPS) together. As the model aims at an explanation of mental ill-health for teachers, considering the role of SPS as well, it does not include the additional variables and results that are available for the clinical sample (i.e., the third part of the Results section). Based on findings with regard to the validity of the construct of SPS (i.e., part one of the Results section) it specifically utilizes results revealed in the second and fourth part (and related research questions and hypotheses) of this study's results.

Research question 4.7: Is it possible to develop a model for the development of mental illness that is generalizable (and therefore applicable to both samples) and based on existing findings and models explaining the onset of stress, and can also be transferred to research on SPS?

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7. Methodology

The following chapter on methodological issues describes the project context (chapter 7.1.), which the study is embedded in, the procedure of data collection (chapters 7.2.), the data cleaning process and decisions about missing values (chapter 7.3.), leading to the final two samples. After an overview of socio- and school-related demographic data in chapter 7.4., all measurement instruments and scales in the questionnaire that are important for the present study (chapter 7.5.) as well as statistical analyses that will be applied in order to answer the research questions and hypotheses described in the previous chapter (chapter 7.6.) are described.

7.1. Project Context

The present study was conducted as part of a bigger collaboration project between the Chair of School and Teacher Research (Prof. Dr. Kiel) of the Ludwig-Maximilians-Universität in

Munich and the psychosomatic clinic, namely the Schön Klinik Roseneck, in Prien near Chiemsee (contact person: Prof. Dr. Dr. Hillert), both located in Bavaria, southern Germany. As part of the "Qualitätsoffensive Lehrerbildung" (English translation: "Quality offensive teacher education"), it was funded by the Bundesministerium für Bildung und Forschung (English translation: "Ministry of Education and Research") for a time frame between October 2015 and December 2018. The goal of the project, called "Risiko-Check für das Lehramt" (English translation: "Checking risks of the teaching profession"), was preventative in nature and can be divided into three steps: The first aim was to identify empirical criteria of successful teaching as well as those that are responsible for some of the teachers' perception of more intensive strain. Characteristics under investigation were those related to one's personality as well as those of the professional environment. These analyzed criteria were subsequently transferred to and applied in an online tool, which offers (prospective) teaching students feedback with regard to the fit of their own abilities and personality characteristics and professional demands. In case of resulting combinations of characteristics that are assumed to make it harder for teacher-students to deal with future professional demands and stress within the teaching profession, the assessment does not just contain evaluations, but also offers developmental tasks and exercises as well as resources to help students develop in those particular areas further on a personal basis.

The present study utilized this project, established collaborations and the developed questionnaire. In relation to the aforementioned goal of the underlying project, it sets a focus on the personality trait of SPS, a temperament trait with a long history of research across scientific contexts, including developmental and personality psychology, recently summarized under the meta-theory of environmental sensitivity (e.g., E. N. Aron & Aron, 1997; Pluess, 2015; see chapter 3.9.4.). In particular, the present study aims at investigating the contribution of this particular trait for the teaching environment in addition to the other aforementioned variables being investigated in this project.

7.2. Study Design and Data Collection Procedure

The present study followed a non-experimental, cross-sectional design as data were only collected at one point in time for a total of $N = 337$ participants. As already described above, the total sample of the study consists of two samples of teachers, who voluntarily participated in the study: $n = 143$ mentally ill teachers, who are treated at the Schoen Klinik in Prien near

Chiemsee in Bavaria, Germany, and n = 194 healthy teachers (i.e., in this context healthy meaning without diagnosis and treatment of psychological illnesses) working in different schools across Bavaria. Data collection took place between July of 2016 and December 2017. Feedback (i.e., in the form of general descriptive data) was only given to the participants in the clinical sample, who agreed to receiving one. Although this was not possible for the non-clinical sample due to anonymity, the two organizations supporting the online data collection process, received a summary of results. The following two sections describe more specific information on the data collection processes.

7.2.1. Data collection with the clinical sample.

The first group of participants with a diagnosed mental disorder received the printed version of the questionnaire personally at some time point during their stay at the collaborating psychosomatic clinic. In order to personally talk to the patients in the clinic, a project collaborator (i.e., the author of this study) went to Prien near Chiemsee on a regular basis (i.e., every two weeks during the total 18 months of data collection). During this data collection process, one of the most important aspects of this conversation concerned the anonymity of participation. Patients were given the choice to either fill out a questionnaire anonymously or one that had their name on it. If patients filled in the non-anonymous questionnaire, a broader range of additional and more detailed information was available from the clinic for those specific patients, which would benefit the study. In order to offer patients an in-depth insight into the study's procedures and goals, these circumstances were also explained in detail to the patient. Of course, data privacy and administrational issues were also clarified. Participants had the opportunity to confirm their consent through their signature on the last page.

In those cases, in which a personal meeting was not possible, all the aforementioned information was given on a pre-written letter, which – together with an anonymous and a non-anonymous printed questionnaire as well as the return envelope – was put in their official mailbox in the clinic.

7.2.2. Data collection with the non-clinical (online) sample.

The second group of teachers, representing the non-clinical sample, received the questionnaire in the form of an online-version. The platform which the questionnaire was put on was offered for free by LMU in Munich. Access was therefore possible by clicking a specific link. Creating an account or other specific requirements of the computer or of any other kind was not necessary

in order for teachers to participate in the study. Different than the data from the clinical sample, all data collected in the non-clinical sample were anonymous. A distribution of that link was realized through advertisements during seminars and presentations by researchers of both collaborating institutions and through a link on the webpages from the Bayerischer Beamtenbund (Bavarian Union of Public Officials) and the Bayerischer Lehrer- und Lehrerinnenverband (BLLV; Bavarian Union of Teachers), both unions of teachers in Bavaria. In addition to the link on their webpage, a short introductory paragraph about the study and a call for participation was also posted in one of the newsletter of the Bayerischer Beamtenbund. Similar to the first sample, both unions were offered a summary of the results as a thank-you for their support and effort.

Similar to the printed version described in line with the clinical sample, general information about the project in general, contact information of the responsible researcher as well as anonymity and administrational issues were included. Additionally, there are three important aspects that have to be considered when interpreting the data collecting this way: On the one hand, there is no information available about whether some participants might have clicked or filled in the questionnaire more than one time, because they did not have to login or put any code for identification on the page before participating in the online-study. Second, although the questionnaire contained an item asking about the teaching experience in years and an item asking participants about their age, there was no question about retirement and whether and in cases of positive answers for how long they have not been taught any more in any schools. This led to the circumstance that although one can easily identify the teachers, who were still participating in the 2-year-internship program by taking all participants out, who reported 0, 1 or 2 years of teaching experiences, it was difficult to identify those, who have not been actively teaching for more than five years. However, it was clarified in the introductory statement that this study is made for teachers, who were working at this time. Furthermore, questions related to teachers' everyday professional life should signal to those teachers who no longer work in the school context to either cease responding part-way through or to not participate in the study altogether. As a third circumstance, it is important to consider that the system the questionnaire was embedded in, required all items and questions to be answered in order for the participant to move on to another page. If a participant did not answer all questions on a page, it was not possible for him or her to move forward in in the questionnaire. This led to numerous participants discontinuing the questionnaire at one point and consequently missing values on

all remaining scales and items. This is of particular importance when considering patterns of missing data, which will be described in more detail later in this section.

7.3. Decisions Regarding Missing Values

The data cleaning process consisted of two general steps that are also suggested in various statistics books (e.g., Hair, Black, Babin, Anderson, & Tatham, 2006): First, it included the analysis of the preliminary requirements regarding their individual teaching experiences, which were in particular:

- participants had more than two years of experiences in schools and were therefore not participating in a two-year internship subsequent to their university studies;
- they had left schools for no longer than five years due to any reasons, including (early) retirement, illness or any other reasons for work incapacity.

As a second step, missing values were analyzed statistically. Missing values in this context are defined as those cases in which participants did not answer a certain question. This step was particularly important for two reasons: Firstly, because high amounts of missing data would lead to the reduction in the sample size, and, secondly, due to the bias that could result from conducting analyses with missing data that follows a pattern, but is not accounted for (e.g., Hair et al., 2006). To prevent these aforementioned negative effects, the missing data will first be described using descriptive statistics and further analyzed with regard to a possible underlying pattern that would be able to explain missingness of values, which is generally not known to the researchers. Investigating patterns of missing data can lead to insight as to whether missingness is due to the data and the scales themselves and represents the basis for decisions on the particular methods to apply. One example for such a widely accepted method in cases of missing data following a specific pattern could for example be multiple imputation (e.g., van Buuren, 2012).

7.3.1. Missing values in the clinical sample.

7.3.1.1. Preliminary requirements regarding individual teaching experience.

Based on the preliminary requirements described above, a total of seven participants had to be removed from the data set, leading to a total of 136 teachers in the clinical sample. Most of those participants did not meet the criteria for being out of school for less than five years. During

the conversations with patients, they revealed this to be due to various reasons, including regular retirement, sickness, or inability to work for other various reasons.

7.3.1.2. Analysis of missing values.

Subsequently, the data set was checked for missing values. Looking at the frequency of the missing values, a total of 39 participants (out of 136 participants, equaling 28.68%) showed missing values, which ranged from only one value, representing 0.50% of the total number of variables and items, to 57, equaling a percentage of roughly 27% of all variables in the data set. In comparison, more than two thirds of the data did not show any missing values. The more detailed distributions of the percentages of missing values and the frequency of those found in the data set can be found in Table 9 below.

Table 9

Number and Proportion of Missing Values and Respective Frequency in the Clinical Data Set

Amount and percentage of missing values	Frequency and percentage in the data set
0 (0%)	69 (50.74%)
1 (0.50%)	29 (21.32%)
2 (1%)	10 (7.35%)
3 (1.42%)	11 (8.09%)
4 (1.89%)	4 (2.94%)
5 (2.36%)	1 (0.74%)
6 (2.83%)	1 (0.74%)
7 (3.30%)	2 (1.47%)
8 (3.77%)	1 (0.74%)
9 (4.25%)	2 (1.47%)
25 (11.79%)*	1 (0.74%)*
42 (19.81%)*	2 (1.47%)*
45 (21.23%)*	1 (0.74%)*
56 (26.42%)*	1 (0.74%)*
57 (26.89%)*	1 (0.74%)*

Note. *: Participants were taken out of the final clinical sample due to their amount of missing data.

In order to investigate whether the missing values follow any kind of pattern related specific variables and scales in the data set, the MCAR-test by R. J. A. Little (1988) was applied. Results revealed a non-significant result, suggesting the data to be missing completely at random and not following any specific pattern (χ^2 = 479,724, *df* = 11517, $p > .05$), which would have an effect on results applying common statistical analyses. Based on this result, it was possible to apply common and widely accepted methods that have been described in the literature, one of which is the deletion of certain missing data (see O. Lüdtke, Robitzsch, Trautwein, & Köller,

2007). One common application proposes deleting all participants, who were missing more than 5% of the total data, if this number was not more than 5% of the total data set. For the present clinical data set, only six of the participants had missing values that are higher than 5%, which equals a percentage of 4.41 of the total number of participants in this sample. In particular, most affected were those with 25 or more values missing. The particular participants taken out are also marked with an asterisk in Table 9 above. After taking those additional five participants out of the data set, the remaining clinical sample consisted of 130 participants.

7.3.1.3. Summary of the final clinical sample.

From the original data set of 143 participants in the clinical sample, the following decisions were made that led to the final sample size of 130 participants in that sample:

- n = 7 participants did not meet the requirements made with regard to the teaching experiences. The majority of those affected was not actively teaching any more for over 5 years;
- missing values did not follow a specific pattern and were completely at random. This made it possible to take out the six participants, who were missing more than 5% of values in the total scale. This procedure was in line with common and widely accepted methods suggested in the literature (e.g., O. Lüdtke et al., 2007).
- This resulted in 103 patient participants, who agreed on a match with a second clinical data set (i.e., additional clinical data are available) and 27 participants, who did not.

7.3.2. Missing values in the non-clinical sample.

7.3.2.1. Preliminary requirements regarding individual teaching experience.

Based on the two requirements mentioned in the introductory paragraph, a total of 21 participants had to be removed from the data set, because they reported 0, 1 or 2 years of teaching experience. Compared to the cases in the clinical sample, which were mostly part of the second category of teacher not actively teaching any more, the number of years of experiences reported in the online-sample make those participants fall into the first category of teachers, who are still participating in their two-year teaching internship. This led to a remaining number of 269 participants. Considering the mentioned lack of information with regard to those teachers, who were retired or were for any other reason not teaching any more, the age of participants was analyzed in more detail as one indicator for retirement. Based on that information, it was decided to not take any more participants out of the data set.

7.3.2.2. Analysis of missing values.

As a second step, missing values are described and checked for possible underlying patterns. This was of especially high importance in the non-clinical sample, because, as it was already described above, participants were forced to answer all questions of a page in order to move on to the next page of the questionnaire. This difference and impact of the aforementioned modalities become even more apparent when looking at the distribution of all missing values in Table 10 below.

Table 10

Number and Proportion of Missing Values and Respective Frequency in the Non-Clinical Data Set

Amount and percentage of missing values	Frequency and percentage in the data set
0 (0%)	194 (72.86%)
15 (7.08%)	1 (0.37%)
31 (14.62%)	3 (1.12%)
69 (32.55%)	2 (0.74%)
86 (40.57%)	1 (0.37%)
99 (46.70%)	1 (0.37%)
114 (53.77%)	1 (0.37%)
130 (61.32%)	6 (2.23%)
132 (62.26%)	2 (0.74%)
143 (67.45%)	8 (2.97%)
144 (67.92%)	1 (0.37%)
153 (72.17%)	1 (0.37%)
164 (77.36%)	1 (0.37%)
165 (77.83%)	6 (2.23%)
177 (83.49%)	11 (4.09%)
189 (89.15%)	12 (4.46%)
201 (94.81%)	18 (6.69%)

In the table above it can be seen that 75 participants (i.e., 27.90%) were missing more than 5% of the variables. As in the case of the clinical sample, potential patterns with regard to missing data were also analyzed. The MCAR test revealed a significant result ($\chi^2 = 1488.04$, $df = 1380$, $p < .05$), suggesting that missing data were not completely at random, but related to the specific variables measured. This is suspected to be the product of the non-randomized fixed presentation order because most missing values occur toward the end of the questionnaire due to an early termination of the questionnaire by the participants (for example by closing the window). As such, it was decided to take out all participants with more than 5% of missing values. Because this decision affects all 75 cases with missing values in the present data set, the final sample size of this sample dropped to 194 teachers.

7.3.2.3. Summary of the final non-clinical sample.

From the original data set of n = 290 participants in the non-clinical sample, the following decisions were made that lead to the final sample size of 189 participants in that sample:

- n = 21 participants did not meet the requirements made with regard to the teaching experiences. The majority of those affected was still part of the two-year-internship;
- finally, it was revealed that missing values followed a specific pattern due to the aforementioned modalities. Early determination of participation therefore affected the same items and scales. This led to the decision that all 75 participants with missing values were taken out of the data set.

7.4. Description of Socio- and School-Related Demographic Data

After the data cleaning process described, the final clinical and non-clinical samples consisted of 130 and 194 teachers respectively. Table 11 below displays an overview of the most important sociodemographic and school-related demographic characteristics of both samples separately. With regard to socio-demographic data, it can be seen that the distributions of female and male participants did not differ significantly one another in both samples as was revealed by the non-significant result of the Pearson's chi-square coefficient ($\chi^2(1) = 2.44$, *n.s.*; Cramer's $V = .09$, n.s.). With regard to the age of the participants, the distribution of years of age differed between the two samples (independent-samples Kolmogorov-Smirnov test: $p < .001$). Additionally, the mean age was found to be higher in the clinical sample ($M = 52.55$, $SD = 9.02$) compared to the non-clinical sample ($M = 44.28$, $SD = 10.08$). This difference was found to be statistically significant ($t(292{,}164) = 7.68$, $p < .001$) with a mean age difference of 8.26 years.

With regard to the school-related demographic variables, following results regarding differences and similarities were revealed: A relationship between sample and which function teachers had in their schools was suggested ($\chi^2(3) = 12.06$, $p < .01$). This relationship is suggested to be small in size (Cramer's $V = .22$, $p < .01$). A relatively higher number of participants in the non-clinical sample reported to be principals or school-psychologists. However, this difference has to be interpreted carefully due to the high number of missing values in the clinical sample (i.e., ca. 20%). The average number of years of work experience was significantly higher in the clinical sample ($M = 24.50$) compared to the non-clinical sample ($M = 17.63$; ($t(321) = 5.91$, $p < .001$). Similarly, the distribution of years of experiences with

teaching reported by participants of both samples also differed significantly between them (independent-samples Kolmogorov-Smirnov test: $p < .001$).

Lastly, it was asked which school type participants taught in. Pearson's chi-square test suggested a significant relationship between sample and school type ($\chi^2(6) = 40.46$, $p < .001$), which reached medium size (Cramer's $V = .35$, $p < .001$). In particular, a higher percentage of teachers in the non-clinical sample worked in elementary schools, secondary schools (grades 5-9), and grammar schools. Table 11 below contrasts the demographic data of both samples.

Table 11

Summary of Socio and School-Related Demographic Data of Both Samples

Variable	Answering options	Clinical sample (n = 130)		Non-clinical sample (n = 194)	
		Number	Percentage	Number	Percentage
Gender	Female	92	70.80%	121	62.37%
	Male	38	29.20%	73	37.63%
Age (in years)	26-35	8	6.16%	48	27.74%
	36-40	6	4.62%	26	13.40%
	41-45	13	10.00%	33	17.01%
	46-50	17	13.08%	31	15.98%
	51-55	27	20.77%	28	14.43%
	56-60	31	23.85%	15	7.73%
	61 and older	26	20.00%	13	6.70%
Work experie-nce (in years)	3-10	11	5.69%	61	31.44%
	11-15	14	10.77%	29	14.95%
	16-20	19	14.62%	36	18.56%
	21-25	11	8.46%	23	11.86%
	26-30	26	20.00%	19	9.79%
	31-35	15	11.54%	14	7.22%
	36-40	14	10.77%	11	5.67%
	41and more	7	5.39%	1	0.52%
School type	Elementary school	33	25.38%	68	35.05%
	Secondary school (grades 5-9)	11	8.46%	47	24.23%
	Secondary school (grades 5-10)	15	11.54%	17	8.76%
	Grammar school	21	16.15%	37	19.07%
	School for special needs education	11	8.46%	12	6.19%
	Vocational School	18	13.85%	8	4.12%
	Other	20	15.38%	5	2.58%

7.5. Measuring Instruments

The questionnaire specifically developed for the proposed research project comprises various scales that aim at measuring different aspects of personality-related and environmental characteristics specific to teaching. While the total questionnaire applied in the present study can be found in the Appendix (Appendix B), the upcoming sections describe all variables and scales included in the present project based on the following groups of variables: SPS, personality-related characteristics, measurements of psychological well-being, the relationship between work and free time and variables of the teaching environment, and additional items and scales.

7.5.1. Sensory-processing sensitivity.

A scale aiming at measuring the variable of SPS was already established and included in the first article published by Arthur Aron and Elaine N. Aron in 1997 (for more detailed information on the theoretical background of the trait, see chapter 3.2.). The development of this scale was realized in different steps: The first step included 39 qualitative in-depth interviews, each taking around three to four hours, with participants in California, USA. The recruitment of volunteers for the interviews was realized through an announcement in a newsletter, which asked for voluntary participation of people who are "either highly introverted (for example, preferring the company of one or two people) or easily overwhelmed by stimulation (such as noisy places or evocative or shocking entertainment)" (E. N. Aron & Aron, 1997, p. 350). 12 out of the 39 interviewees were students (E. N. Aron et al., 2012, p. 272). Aron states that "respondents were seen as collaborators in the exploration of the concept, and both the interviewer and respondent were free to digress and explore particular issues" (p. 351). This approach generally follows the multi-method approach, which is one of the methods applied in order to further explore new concepts in the field of personality (e.g., Boyle & Helmes, 2009). The questions stated during the interview sessions aimed at identifying particularly characteristics, behavioral tendencies and personal experiences that would go along with the trait. Furthermore, they also asked about hobbies, their environment during their childhood, social contacts and beliefs. Based on the information collected in the interviews and the subsequent studies in which they also measured their personality based on the Myers-Briggs Type Indicator (developed by Myers, 1962), E. N. Aron and Aron (1997) realized that although SPS might be related to introversion, the scale is measuring something else.

Based on these findings, as a second step, E. N. Aron and Aron compiled a questionnaire including a total of 27 items, stated as questions and to be answered on a 7-point Likert scale. This scale (also included in Appendix B) has been applied in numerous studies throughout the years, supporting the scales reliability and validity (e.g., Acevedo et al., 2014; E. N. Aron et al., 2012; Gearhart, 2014; Smolewska et al., 2006; Sobocko & Zelenski, 2015; for more detailed information about the scale's psychometric properties, see chapter 3.3.2.). However, in addition to the original scale comprising 27 items, variations of the scale with less items can be found, which already has been described in a previous theoretical section (see chapter 3.3.). In the present study, a 12-item version was applied based on suggestions by Pluess (2013; see E. N. Aron & Aron, 2018), all of which are also found in the original 27-item scale and selected in a way that they represent the three most popular factors (M. Pluess, personal communication, April 18, 2018). In order to get a German translation, which is high in quality and at the same time comparable to the already existing German versions of the scale, the following two steps were applied:

- at first, the back-translation method (Brislin, 1970) was applied. Based on this method, the English original was translated into German and back again from German into English. This was realized by three people (i.e., two PhD students and one professor), who were all fluent in German and English (i.e., one person's native language was English, the other two people's native language was German). Subsequently, the original version was compared to the final English back translation. In those cases, in which significant differences were found, they were discussed again. The discussions took place including all three aforementioned researchers.
- As a second step, which aimed at enhancing the validity and quality of the translated scales, numerous already existing German translation were reviewed (e.g., Blach, 2016; Borries, 2012; Konrad & Herzberg, 2017) and compared to the resulting translation of the present study. In those cases, in which translations differed from each other, the issue was broached during the group discussion.

Additionally, it is important to state that the items, which were originally stated as questions (e.g., E. N. Aron & Aron, 1997) were changed into questions in order to adjust this scale to the remaining scales. However, this has been done before in German (e.g., Borries, 2012; Konrad & Herzberg, 2017) versions before. Furthermore, all statements were answered on an uneven 5-point Likert scale, ranging from 1 (*not true at all*) to 5 (*very true*). This was due to adjustment

to the remaining scales included in the questionnaire. In the present samples, Cronbach's alpha reached .73 and .79 in the clinical and the non-clinical sample respectively. In both samples, deleting the first item would lead to a minimal increase in the coefficient in the third number behind the comma. Although they were somewhat smaller than the reliability coefficients revealed with the original 27-item version, these values can be interpreted as acceptable to good (e.g., P. Kline, 1999). Furthermore, they are comparable to reliabilities revealed applying the short 12-item version by Michael Pluess (e.g., Pluess et al., 2018; Pluess & Boniwell, 2015). This was particularly true given the smaller number of items in the shortened version that is assumed to effect the size of the coefficient (Cortina, 1993).

Table 12 below depicts all original items (i.e., as questions) and the German translations (i.e., as statements) of the scale measuring SPS applied in the present study. Given that this scale represents one of the underlying variables in the present study, the particular means, standard deviations and corrected item-total-correlations are also depicted separately for both samples.

Table 12

Summary of Means, Standard Deviations and Corrected Item-Total Corrections Across Items of HSP-Scale in Both Samples

Item	Clinical sample (n = 130)			Non-clinical sample (n = 194)		
	Mean	Standard deviation	Corrected item-total correlation	Mean	Standard deviation	Corrected item-total correlation
1) English original: Do you seem to be aware of subtleties in your environment? German translation: Ich scheine Feinheiten in meiner Umgebung wahrzunehmen.	4.02	1.04	.25	3.79	0.94	.23
2) English original: Are you easily overwhelmed by things like bright lights, strong smells, coarse fabrics, or sirens close by? German translation: Ich fühle mich rasch überwältigt von Dingen wie gleißendem Licht, starken Gerüchen, kratzigen Stoffen oder Sirenen in meiner Nähe.	3.21	1.19	.37	2.45	1.33	.57
3) English original: Do you have a rich, complex inner life? German translation: Ich habe ein reichhaltiges, komplexes Innenleben.	4.04	0.92	.27	3.77	0.90	.34
4) English original: Are you deeply moved by the arts or music? German translation: Ich fühle mich von Kunst oder Musik tief ergriffen.	3.89	1.08	.34	3.56	1.08	.27
5) English original: Do you get rattled when you have a lot to do in a short amount of time? German translation: Es irritiert mich, wenn ich in kurzer Zeit viel schaffen muss.	3.44	1.22	.50	2.74	1.16	.53
6) English original: Do you make a point to avoid violent movies and TV shows? German translation: Ich mache einen Bogen um gewalttätige Filme oder Fernsehsendungen.	3.90	1.25	.22	3.43	1.41	.29
7) English original: Are you annoyed when people try to get you to do too many things at once? German translation: Es nervt mich, wenn jemand versucht mich zu viele Dinge auf einmal tun zu lassen.	4.13	1.02	.47	3.45	1.16	.52

(continued)

Item	Clinical sample (n = 130)			Non-clinical sample (n = 194)		
	Mean	Standard deviation	Corrected item-total correlation	Mean	Standard deviation	Corrected item-total correlation
8) English original: Do changes in your life shake you up? German translation: Veränderungen im Leben bringen mich durcheinander.	3.44	1.00	.44	2.75	1.05	.53
9) English original: Do you notice and enjoy delicate or fine scents, tastes, sounds, works of art? German translation: Ich bemerke und genieße zarte oder feine Gerüche, Aromen, Klänge oder Kunstwerke.	3.79	1.26	.25	3.67	1.05	.27
10) English original: Do you find it unpleasent to have a lot going on at once? German translation: Ich finde es unangenehm viel um die Ohren zu haben.	4.02	0.99	.32	3.38	1.03	.63
11) English original: Are you bothered by intense stimuli, like loud noises or chaotic scenes? German translation: Ich fühle mich gestört durch intensive Reize, wie laute Geräusche oder chaotische Szenen.	4.25	0.98	.51	3.45	1.24	.62
12) English original: When you must compete or be observed while performing a task, do you become so nervous or shaky that you do much worse than you would otherwise? German translation: Wenn ich mit anderen konkurrieren oder vor anderen etwas machen muss, dann werde ich so nervös und zittrig, dass ich viel schlechter bin als ich normalerweise sein könnte.	3.13	1.29	.50	2.41	1.22	.35

7.5.2. Additional personality-related characteristics.

In the following section, personality-related variables that have been found to be important for teachers' well-being are described. In the present study, those include self-efficacy, stress-inducing thoughts and coping strategies.

7.5.2.1. Self-efficacy.

Items measuring self-efficacy are based on the German scale measuring general self-efficacy, which was developed by Jerusalem and Schwarzer (1999) and contains ten items. This scale was developed based on the conceptualization of self-efficacy (Bandura, 1977, 1994), which "is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994, p. 71). Statements like "I know that I can keep close contact to the parents, even in difficult situation" (German item: "Ich weiß, dass ich zu den Eltern guten Kontakt halten kann, selbst in schwierigen Situationen") had to be answered on a 4-point Likert scale ranging from 1 (*not true at all*) to 4 (*very true*). In the present study, Cronbach's alphas of .87 and .90 for the clinical and the non-clinical sample were found, which are generally accepted as good for psychological constructs (e.g., P. Kline, 1999).

7.5.2.2. Dysfunctional cognitions (or stress-inducing thoughts).

The scale used to measure stress-inducing thoughts was based on a German scale developed by Trageser (2010), who refers to dysfunctional cognitions as defined by Beck, Rush, Shaw, and Emery (1979). Beck and colleagues (1979), in turn, describe dysfunctional cognitions as automatized personal beliefs that generally a negative effect on people's emotions and behavior (e.g., Brown & Beck, 2002). The scale applied in the present study was developed based on various other scales: a scale measuring dysfunctional attitudes (Hautzinger, Luka, & Trautmann, 1985), one on irrational attitudes (German version by Klages, 1989) and the German version of the Frost Multidimensional Perfectionism Scale (Frost, Marten, Lahart, & Rosenblate, 1990; Stöber, 1995). The total amount of 24 items measure six different aspects with 4 items each, which among others are Dependency or Perfectionism. Participants were asked to judge how much the particular statements apply to their own thought patterns based on a 5-point Likert scale, which range from 1 (*not true at all*) to 5 (*very true*). The overall Cronbach's alpha reached a value of .94 for the clinical sample and .93 for the non-clinical sample. Table 13 below displays more detailed information on the scale, including the six

categories measured and examples as well as measures for internal consistencies (using Cronbach's alpha for each sample) for each sub-scale separately.

Table 13

Summary of Sub-Scales Measuring Dysfunctional Cognitions, Example Items and Measures of Internal Consistency

Sub-scale	Example item	Cronbach's alpha	
		Clinical sample (n = 130)	Non-clinical sample (n = 194)
Dependency	German original: Ich brauche es, dass die Leute mich mögen. English translation: I need people to like me.	.89	.85
Internalization of failure	German original: Ich gebe mir gewöhnlich selbst die Schuld, wenn die Dinge schief gelaufen sind. English translation: I usually blame myself, if things went wrong.	.90	.88
Depreciation and failure	German original: Wenn ich nicht ständig gut arbeite, dann werden die anderen mich nicht achten. English translation: If I don't do well all the time, other people will not respect me.	.89	.88
Perfectionism	German original: Ich habe extrem hohe Ziele. English translation: My goals are extremely high.	.84	.86
Avoidance of social support	German original: Wenn ich Kollegen oder Eltern um Unterstützung bitte, ist dies ein Zeichen meiner Inkompetenz und Schwäche. English translation: If I ask colleagues or parents for help, this is an indication of my incompetence and weakness.	.90	.88
Risk avoidance	German original: Es wäre schrecklich etwas zu tun, wenn ich dabei nicht weiß, was auf mich zukommt. English translation: It would be terrible to do something, if I don't know what will happen.	.84	.77

Note. Sub-scales taken from the scale by Trageser (2010).

7.5.2.3. Coping strategies.

Coping strategies were measured applying an already existing set of 24 items (Lehr et al., 2008). Each sub-scale was measured with three to four items each, representing strategies like Relaxation or Social withdrawal. Statements provided in the items had to be answered based on the likelihood of which participants would apply the described behavioral reactions in

stressful situations. Five options are included with a range from 1, indicating the option *not likely at all*, to 5, indicating *very likely*. The overall reliability reached a score of .62 in the clinical sample and .68 in the non-clinical sample, which can be interpreted as questionable for both samples. However, due to the fact that only the particular sub-scales were applied in the present study, these values can be regarded as only secondary. Table 14 below displays more detailed information on the scale, including the six strategies and the two additional items, the number of items, examples as well as measures for internal consistencies (using Cronbach's alpha for each sample) for each sub-scale separately.

Table 14

Summary of Sub-Scales Measuring Coping Strategies, Example Items and Measures of Internal Consistency

Sub-scale	No. of items	Example item	Cronbach's alpha	
			Clinical sample (n = 130)	Non-clinical sample (n = 194)
Relaxation	3	German original: … denke ich an etwas, das mich entspannt. English translation: … I think about something that relaxes me.	.73	.69
Social Withdrawal	3	German original: … meide ich Menschen. English translation: … I avoid people.	.93	.91
Control of reaction	4	German original: … versuche ich mein Verhalten unter Kontrolle zu bringen. English translation: … I try to control my behavior.	.80	.72
Proactive problem solving	4	German original: … mache ich mir einen Plan, wie man die Schwierigkeiten aus dem Weg räumen kann. English translation: … I establish a plan how to eliminate the difficulties.	.68	.74
Exploration of positive experiences	4	German original: … beschäftige ich mich mit etwas Angenehmem. English translation: … I engage in something pleasant.	.91	.91
Resignation	4	German original: … bin ich deprimiert. English translation: … I am depressed.	.86	.87

Note. Sub-scales taken from the scale by Lehr and collegues (2008).

As can be seen, all but two measures of consistency reached an acceptable to good level (e.g., P. Kline, 1999). However, the remaining two scores were relatively close to the critical threshold of acceptable internal consistency, which is set at around $\alpha = .70$ (see the overview by Tavakol & Dennick, 2011). Due to its common application in the research field for various years and in numerous publications (mostly in the German speaking area; see for example, Braun, 2017; K. Lüdtke, 2017), this scale was applied without any changes in the present study as well.

7.5.3 Measures of mental ill-health.

The following section aims at summarizing instruments that have been applied in the present study to measure psychological well-being. In particular, those were an instrument measuring depression, anxiety, and stress as well as an additional scale, mostly applied in clinical settings, measuring depression.

7.5.3.1. Depression, anxiety, and stress.

In order to measure and control for participants' negative emotional states, which are Depression, Anxiety and Stress/tension, the short German version of the Depression Anxiety and Stress Scale (DASS-21; Nilges & Essau, 2015) is included in the questionnaire. This scale is based on the original conceptualization by Lovibond and Lovibond (1995). Of the total of 21 items, seven items measured each of the three states. Participants were asked to answer all items based on how strongly they felt what is described in the sentences within the last week. The offered options for answering the items range from 1 (*rarely (max. 1 day)*) to 4 (*usually (at least 5 days)*). The overall reliability was found to be .95 for both samples separately as well as the total sample. Table 15 provides an overview of the three sub-scales, an example item and Cronbach's alpha for each sub-scale. As was already the case above, values for Cronbach's alpha are reported separately for the two samples.

Table 15

Summary of Sub-Scales Measuring Psychological Well-Being (i.e., Depression, Anxiety, and Stress), Example Items and Measures of Internal Consistency

Sub-scale	Example item	Cronbach's Alpha	
		Clinical sample (n = 130)	Non-clinical sample (n = 194)
Depression	German original: Ich konnte überhaupt keine positiven Gefühle mehr erleben. English translation: I couldn't experience any positive emotions at all.	.92	.91
Anxiety	German original: Ich spürte, dass mein Mund trocken war. English translation: I felt that my mouth was dry.	.85	.88
Stress	German original: Ich tendierte dazu, auf Situationen überzureagieren. English translation: I tended toward overreacting to situations.	.88	.88

Note. Sub-scales taken from the original DASS-21 scale by Nilges and Essau (2015).

In order to interpret the resulting sum scores, which can range from 0 to 28 for each subscale on all three sub-scales, cut-off values and related interpretations of ranges of scores have been suggested. As a first step, sum scores have to be multiplied by two, leading to all sum scores ranging from 0 to 56, and subsequently compared to the suggested cut-off-values.

The table depicted below (Table 16) offers an overview of all five suggested categories, related sum score ranges and the distribution of number of participants in these particular categories separately for both samples. Additionally, means and standard deviations on all three variables are given for both samples separately.

Table 16

Overview of Participants Assigned to Different Categories Based on Severity of Depression, Anxiety, and Stress

Range of sum scores	Category description	Number of participants	
		Clinical sample (n = 130)	Non-clinical sample (n = 194)
Depression			
0 – 9	Normal	20	0
10 – 13	Mild	27	0
14 - 20	Moderate	45	120
21 – 27	Severe	33	36
>27	Extremely Severe	5	38
		M = 16.51	M = 21.53
		SD = 6.11	SD = 8.85
Anxiety			
0 - 7	Normal	12	0
8 – 9	Mild	30	0
10 - 14	Moderate	41	79
15 – 19	Severe	31	63
>19	Extremely Severe	16	43
		M = 12.98	M = 18.63
		SD = 4.99	SD =7.32
Stress			
0 – 14	Normal	41	9
15 – 18	Mild	34	27
19 – 25	Moderate	46	53
26 – 33	Severe	9	56
> 33	Extremely Severe	0	49
		M = 17.52	M = 27.63
		SD = 5.37	SD = 9.17

Note. Categories taken from Nilges and Essau (2015). M = Mean; SD = Standard deviation.

7.5.3.2. BDI-II as an additional measurement of depression.

As a second instrument measuring depression, which is more commonly used in clinical settings, the Beck Depression Inventory II (Beck, Steer, & Brown, 1996) was applied in the clinical sample as well. It represents the successive version of the Beck Depression Inventory (Beck et al., 1979; German version by Hautzinger, Keller, & Kühner, 2006), both aiming at measuring depressive symptoms based on the categorization system DSM-V (APA, 2013). It represents a self-report, which can be applied to participants, who are older than 13 years. As an introduction of the scale, participants were asked to describe changes in various states and emotions, such as sadness, loss of joy, or tiredness, on a 5-point Likert-scale. Psychometric properties of this version have been found to be similar to the BDI (Dozois, Dobson, &

Ahnberg, 1998). In particular, reliability measures were found to be above $\alpha = .90$ among students and patients (e.g., Beck et al., 1996; Dozois et al., 1998) and various forms of validity have been supported as well (e.g., Beck et al., 1996).

In the present study, this questionnaire was only administered to participants in the clinical sample. For patients, who agreed to a combination of the questionnaire with additional data, their scores on the BDI-II was accessible through the psychosomatic clinic. Because the BDI-II represents a standard measure for patients in the clinic, it was administered to patients in the beginning and the end of their stay in order to monitor their depressive symptoms. In order to interpret the resulting sum scores, which can range between 0 and 63, cut-off values have been defined. Table 17 below includes the different categories and related cut-off scores as well as their interpretation.

Table 17

Overview of Categories of the BDI-II

Range of sum scores	Category description
0 - 13	No or minimal depressive symptoms
14 – 19	Mild depressive symptoms
20 - 28	Moderate depressive symptoms
29 – 63	Severe depression

Note. Categories taken from Hautzinger and colelagues (2006).

7.5.4. Measuring the relationship between teachers' work and their personal life.

In order to measure participants' perceived relationship between their work and their personal lives, the Trierer Kurzskala zur Messung von work-life-balance (English translation: The Trier Short Scale for Measuring Work-Life-Balance; Syrek et al., 2011) was included in the questionnaire as well. Based on current research findings and theories on work-life balance, it aims at offering a possibility to measure work-life balance in a subjective, global and non-directional way (Syrek et al., 2011, p. 136). With their item wording and content, it combines affective and cognitive aspects and at the same time relates back to various theoretical assumptions, such as the Conservation of Resources Theory (Hobfoll, 1998). It consists of five items in total (see Table 18), which had to be answered on a 6-point Likert scale, ranging from 1 (*not true at all*) to 6 (*very true*). The internal consistency for both sub-scales was found to be good with Cronbach's alphas of .86 and .93 in the clinical and the non-clinical sample respectively, which is similar to findings in other studies (e.g., Syrek et al., 2011).

Table 18

Summary of Items Measuring Work-Life Balance

Item no.	Item
1	Original: Ich bin zufrieden mit meiner Balance zwischen Arbeit und Privatleben. Translation: I am happy with my balance between work and personal life.
2	Original: Es fällt mir schwer, Berufs- und Privatleben miteinander zu vereinbaren.[R] Translation: I find it difficult to balance my work and personal life. [R]
3	Original: Ich kann die Anforderungen aus meinem Privatleben und die Anforderungen aus meinem Berufsleben gleichermaßen erfüllen. Translation: I can meet the demands of my private life and the demands in my work life equally.
4	Original: Es gelingt mir, einen guten Ausgleich zwischen belastenden und erholsamen Tätigkeiten in meinem Leben zu erreichen. Translation: I can manage to reach a good balance between incriminatory and recreational activities in my life.
5	Original: Ich bin zufrieden damit, wie meine Prioritäten in Bezug auf den Beruf und das Privatleben verteilt sind. Translation: I am happy with the distribution of my priorities with regard to my occupation and my private life.

Note. The original scale by Syrek and colleagues (2011) is in German.
[R] Recoded item.

7.5.5. Characteristics of the teaching profession.

The following section describes different scales that have been included and developed in order to measure characteristics that are specific with regard to the teaching profession. As a first aspect, collaboration will be described. Subsequently, items on various specific characteristics of the teaching profession will be described, which have been developed based on theoretical descriptions of the professional environment. Finally, a self-developed scale on teachers' perceived performance will be described.

7.5.5.1. Collaboration.

A measurement of teacher collaboration developed by Fussangel and colleagues (e.g., Fussangel, 2008; Fussangel & Gräsel, 2012) was applied in the present study. The scale was developed based on various quantitative and qualitative studies, which aimed at further analyzing perceptions and practices teachers have and apply in their everyday work life. Although the original study was embedded into a chemistry context, it has been applied to more general contexts already. In particular, the resulting scale measures three broader aspects of teacher collaboration: Forms of collaboration, Conditions for successful collaboration, and Benefits from collaboration. Each of these three aspects can further be divided into four subscales, leading to a total of 12 subscales. Participants are asked to indicate whether and how

often they apply all 45 statements during collaboration with their colleagues on a 4-point Likert scale, which ranged from 1 (*never*) to 4 (*very frequently*). Reliability measures (i.e., Cronbach's alpha) reached the following scores for all three aspects of collaboration:

- forms of collaboration: $\alpha = .89$ in both samples;
- conditions of collaboration: $\alpha = .72$ and .67 in the clinical and the non-clinical sample respectively;
- benefits of collaboration: $\alpha = .90$ and .93 in the clinical and the non-clinical sample respectively.

Table 19 below summarizes all three aforementioned broader aspects as well as the related sub-scales for each of these aspects. Furthermore, it offers the specific number of items, an example item (i.e., already translated into English) and measures of internal consistency (Cronbach's alpha) for all sub-scales and samples separately. Because the present study only included the forms and benefits of collaboration, only those two sub-scales are included in Table 19 below. As can be seen in Table 19, all but one (i.e., the sub-scale Co-construction within the broader scale of Forms of collaboration, which revealed scores of .65 and .63 in the clinical and the non-clinical sample respectively) reach Cronbach's alphas between .72 to .93, which can be interpreted as good to very good (e.g., Kline, 1999). However, partially even lower scores were already found in prior studies investigating teacher collaboration (e.g., Cronbach's alphas between.52 and .64 in the study by Fussangel, 2008, p. 200). It is important to note that the sub-scales measuring conditions for successful collaboration are not applied for any statistical analyses in the present study due to the fact that not all participants in the study can answer these items properly (i.e., particularly participants in the clinical sample, who were not actively teaching any more at the time of data collection). This is also the reason why those sub-scales will not be included in the upcoming Table 19.

Table 19

Summary of Sub-Scales Measuring Forms, Conditions, and Benefit of Collaboration, Example Items and Measures of Internal Consistency

Sub-scale	No. of items	Example item	Cronbach's alpha	
			Clinical sample (n = 130)	Non-clinical sample (n = 194)
Forms of collaboration (total: 14 items)				
Professional exchange	4	I exchange lesson material with my colleagues.	.79	.81
Student-related exchange	3	I discuss with my colleagues, if I have difficulties with individual students.	.80	.79
Collective Organization	3	I develop worksheets together with my colleagues.	.89	.88
Co-construction	*4*	*I teach a class together with my colleagues.*	*.65*	*.63*
Benefit of collaboration (total: 15 items)				
Emotional Relief	4	Through collaboration I find out that my colleagues have problems similar to the ones I have.	.88	.92
Professional gain	4	I can apply my colleagues' experiences in my own teaching.	.84	.90
Facilitation	3	Collaboration with my colleagues means more time and effort compared to individual work.[R]		
Improved student focus	3	Students' learning processes are promoted better through collaboration.	.81	.88

Note. Original items are in German and based on the scale by Fussangel (2008). The italicized rows represent the sub-scales with the lowest reliability scores.
[R]Recoded items.

7.5.5.2. Characteristics of the teaching profession.

This scale aimed at measuring how teachers perceive their working environment, was developed particularly for the project the present study is embedded in, and has already empirically shown to reveal some important workplace characteristics (T. Tillmann, Weiß, Hillert, & Kiel, 2019). The theoretical background were the theoretical conceptualizations of the characteristics that have been described already (e.g., Rothland, 2013; for more information on the characteristics, see chapter 2.2.1.2.). For each of the ten characteristics, four to five items were reworded and put into items in collaboration and during discussions with four researchers working at the Chair for School and Teacher Research at LMU in Munich (i.e., Professor Dr. Kiel, PD Dr. Sabine Weiß, Dr. Annika Braun, and the author of the present study), resulting in 47 items. In a pre-study, the items were distributed to a small sample of

N = 39 teachers, who were asked to answer the items on a 4-point Likert scale. Based on results of factor and reliability analyses as well as comments by the participants of the pre-study, some items were re-worded, deleted (i.e., four items) or adjusted. The adjusted and re-worked version resulting from the pre-study was applied in the present research study and contained 43 items.

Overall, Cronbach's alpha revealed a score of .75 and .77 for the clinical and the non-clinical sample respectively. Because the self-developed scales added to the questionnaire was based on the theory by Rothland (2013, for a detail description, see chapter 2.2.1.2.), the factorial structure and internal consistencies were checked as part of the preliminary analyses (see chapter 6.1.2.).

7.5.5.3. Expectations toward teachers and different required roles.

Based on the same theory of work place characteristics of teachers (e.g., Rothland, 2013), a scale with nine items measuring teachers' perceptions of other peoples' expectations toward themselves in their everyday work life was developed as well. In addition to expectations, the scale also includes items on role-adoption that is often necessary to fulfill the different expectations (for more detailed information on theoretical background of both aspects, see chapter 2.2.1.2.). The development and validation process (i.e., through the pre-study) followed the procedure that was applied for the scale measuring characteristics of the teaching profession described above. Preliminary results of the data and participants' comments with regard to the 11 originally developed items indicated that two items had to be taken out of the scale (example item: "Mich in die Erwartungen anderer Menschen einzufühlen, empfinde ich als einfach", English translation: "I find it as easy to empathize with the expectations of other people"). The remaining nine items were included into the questionnaire without any adjustment or changes.

Reliability measures revealed scores of .77 and .75 in the clinical and the non-clinical sample respectively, resulting in good measures of internal consistency (Kline, 1999). Table 20 displays an overview of all nine items included in the questionnaire translated into English.

Table 20

Summary of Items Measuring Expectations Toward Teachers

Item no.	Item
1	The different roles that I have as a teacher, never let me be 'real' or authentic in contact with other people.
2	I always adapt my behavior to the profession's demands on me.
3	It has happened frequently that I could not fulfill the expectations that have been put toward me.
4	Often, I am confronted with contradicting expectations.
5	Balancing different expectations is difficult for me.
6	In general, I try to adapt to the expectations that are askef of me as a teacher.
7	I find it difficult to meet all the expectations, that are asked of me as a teacher.
8	I am aware of the fact that there are different roles I have to take in my everyday school life.
9	There are situations, in which I have to show certain behavior or emotions that contradict my beliefs.

Note. The items were developed based on conceputalizations by Rothland (2013).

7.5.5.4. Teachers' perceived performance.

In addition to the aforementioned scales measuring specific characteristics of the teaching profession, expectations toward teachers, and the different roles teachers have to adopt, a third scale measuring teachers' perceived performance in their professional work life was developed for application in the present study. Following the same procedure as the two aforementioned self-developed scales, suggestions were contributed equally from the chair of school and teacher research and the responsible researchers. Additionally, Professor Dr. Arthur Aron, who at the time was a visiting professor at the Department of Psychology at the University of California at Berkeley, and his wife Dr. Elaine Aron were part of this discussion, which was realized through e-mail contact, and made suggestions on content and wording of the items. The contributions and suggestions resulted in a total of seven items, which are displayed in the table below (Table 21). Translations were carried out using the back-translation method already described in line with the translation of the scale measuring SPS (Brislin, 1970). Also in line with the aforementioned procedure, the items were also validated as part of a pre-study, which, however, differed from the one described above: During the pre-study, all five items were handed to three independent teachers, who at the time worked at the chair of school and teacher research at LMU in Munich and were responsible for offering seminars and lectures for future teachers. As part of the study, they were asked to read the items and give feedback on what they think about the items' content, and language as well as whether they understand the goal of the items. Comments were either written down or communicated directly to the responsible

researcher and author of the present study. Based on results of this pre-study, suggested changes were adopted if perceived as necessary by the responsible researcher. Measures of internal consistency revealed (Cronbach's alpha) scores of .74 and .75 in the clinical and the non-clinical sample respectively, which can be interpreted as good. In the final version of the questionnaire, this set of items was added to the items on teachers' perception of their work place (including the statements on characteristics of the work place and other peoples' expectations).

Table 21

Summary of Items Measuring Perceived Performance

Item no.	Item
1	My students like me.
2	Parents seem to think I am a good teacher.
3	Overall, I am glad I am a teacher.
4	My fellow teachers seem to think I am a good teacher.
5	I feel successful as a teacher.
6	I stay calm in the classroom
7	I can keep good discipline in a classroom.

Note. This scale represents a newly developed scale for the present study. Due to the collaboration with Arthur and Elaine N. Aron on these items, the original items of this scale were formulated in English and subsequently translated into German.

7.5.6. Additional items connecting sensory-processing sensitivity to the teaching profession.

As a connecting point of sensitivity toward the environment and the teaching profession, two sub-scales were developed that aim at measuring certain characteristics people with high levels of environmental sensitivity would show (i.e., the categories Attunement to students and Deeper processing) within the context of teachers' everyday school life. Again, the scale was adapted based on original suggestions by Prof. Arthur and Dr. Elaine Aron through e-mail communications (i.e., on various days in May 2016). Assumptions for these relationships were made based on a previous study within the context of parenting and stress as the general theory. In particular, the basis is the following:

> The idea is that overall HSPs are especially likely to have some of these experiences, such as feeling attuned to the students; and also, that in interaction with level of stress, they may show more for example being glad they are a teacher—with high SPS showing it more strongly than others if under low stress but showing it less strongly than others if under high stress. (A. Aron, personal communication, May 10, 2016)

Table 22 below lists all items as suggested for both categories separately. With regard to measures of internal consistency measures, the sub-scale Attunement to students revealed Cronbach's alpha values of .53 and .34 for the clinical and the non-clinical samples respectively. For the sub-scale Deeper processing, these values were even lower (i.e., clinical sample: $\alpha = .11$, non-clinical sample: $\alpha = .12$). Based on those low, unacceptable values and the fact that the items were developed based on theory, an exploratory analysis of these two sub-scales will be part of the Results section in one of the upcoming results chapters (see chapter 8.2.2.1.). As was already the case for the section on the perception of one's own performance as a teacher, these items were also included in the sub-scale measuring characteristics of the work place.

Table 22

Summary of Items Connecting SPS and the Teaching Profession

Item no.	Item
Attunement to students	
1	I sense what will happen in a classroom almost before it happens.
2	I feel attuned to my students.
3	When a student succeeds in a major way, I am so happy that it is almost as though it has happened to me.
4	When a student is upset, I am affected almost as much as the student is, whether I show it or not.
5	I sense when a particular student needs help.
6	I feel especially attuned to particular students who need help.
Deeper processing in the teaching environment	
1	I think I have made good decisions as a teacher.
2	One of my strengths as a teacher is my creativity.
3	I think deeply about how I have taught and will teach.

Note. This scale represents a newly developed scale for the present study. Due to the collaboration with Arthur and Elaine N. Aron on these items, the original items of this scale were formulated in English and subsequently translated into German. All items are differentiated into two factors.

7.5.7. Additional clinical data.

For participants, who agreed to fill in the questionnaire un-anonymously ($n = 90$), additional clinical data were available (although the availability of data differed between variables). In addition to the scores on the BDI-II scale (i.e., for the time of admission and release) that has been described above, various further measures were made available by the collaborating clinic. They are summarized shortly in the upcoming sections.

7.5.7.1. Patient Health Questionnaire (PHQ).

The German translation of the PHQ (Löwe, Spitzer, Zipfel, & Herzog, 2002) is based on the original version by Spitzer, Krienke, and Williams (1999). It was developed as an economic screening instrument. In combination with medical consultation it can be applied for the diagnostic of the most common psychological illnesses As for the present study, only the first two pages were applied by the clinic, which include Somatoform and Depressive disorders (i.e., major depression and other depressive disorders) as well as anxiety (i.e., panic disorders and other anxiety disorders). Resulting scores can be interpreted categorically or in a continuous way. The continuous interpretation is possible based on the sum scores that are created on the basis of the scores on the respective items. They can be used to keep track of the therapeutic process (i.e., success of therapy) and to gain more information about the severity of the disorder. In the present data set, two sum scores on all three sub-scales were available, which represent the time of admission and release.

7.5.7.2. Global Assessment of Functioning (GAF).

The GAF was first suggested by the American Psychiatric Association (APA) based on the criteria of the fifth axis of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as edited by the American Psychiatric Association (APA, 1994; German version by Saß, Wittchen, Zaudig, & Houben, 2003), which aims at measuring patients' general functional level. In particular, it measures functioning within psychological, social, and professional areas in patients' lives at one time point. Taking more than one point in time into consideration, patients' process, success, or success of therapy objectives can be evaluated as well. The respective scores (i.e., percentages) that are assigned to patients based on the severity of their symptoms or their particular functioning level can range from 1 to 100. Resulting scores are further grouped into the following ten functioning levels, based on the relative severity within a certain level or group of scores, which are the following:

- 100-91: Excellent functioning in a broad spectrum of activities; difficulties in life do not seem to get out of control; no symptoms;
- 90-81: None or minimal symptoms (e.g., slight anxiety before an exam), good performance in all areas, interested and integrated into a broad spectrum of activities, behavior is social effective, generally satisfied with life, common everyday problems and worries (e.g., occasional fight with a family member);

- 80-71: If symptoms are existent, they are only short term or the expected reaction to psycho-social stress factors (e.g., problems concentrating after a fight with the family); not exceeding small disturbances of social, professional and school-related performance (e.g., stay behind in school temporarily);
- 70-61: Some slight symptoms (e.g., depressive mood or slight insomnia OR some slight difficulties with regard to social, professional or school-related performance (e.g., occasional absenteeism of school or theft in the home), but a generally relatively good performance; has a few important interpersonal relationships;
- 60-51: Moderately developed symptoms (low affect, circumlocutory language, occasional panic attacks) OR moderately developed difficulties with regard to social, professional or school-related performance (e.g., few friends, conflicts with colleagues, classmates or attachment figures);
- 50-41: Severe symptoms (e.g., suicidal thoughts, severe compulsory rituals, numerous cases of shop lifting) OR impairment of social, professional or school-related performance e.g., no friends, inability to keep a job);
- 40-31: Disturbances with regard to control of reality or the communication (e.g., language occasionally not logical, incomprehensible or frivolous) OR high disturbance in numerous areas, such as work or school, family relations, judgments, thinking or mood (e.g., a man with a depression avoids friends, neglects his family and is not able to work; a child punches younger children repeatedly, is defiant at home and fails at school);
- 30-21: Behavior is severely influenced by delusional phenomena or hallucinations OR severe disturbance of communication and judgment (e.g., sometimes incoherent, behaves highly inadequately, severe suicidal thoughts) OR low performance in almost all areas (e.g., stays in bed all day, has no job, no home and no friends);
- 20-11: Harm to oneself or others (e.g., suicidal attempts without clear intention to die, often violent, manic affection) OR is sometimes not able to sustain hygiene (e.g., smears with feces) OR severe disturbance of communication (mostly incoherent or mute);
- 10-1: Continuing danger to hurt themselves or others severely (e.g., repeated assault) OR ongoing inability to sustain the minimal personal hygiene OR serious suicide attempt with clear intention to die;
- 0: Insufficient information.

For the present study, two scores were available, one measuring the GAF two months before admission to the clinic and the GAF-score at release.

7.5.7.3. Clinical Global Impression (CGI).

The main purpose of the CGI is "to provide a global rating of illness severity, improvement and response to treatment" (Guy, 1976, p. 125). The three-item measurement is answered on a 7-point Likert scale, ranging from 1 (*normal*) to 7 (*amongst the most severely ill patients*). It measures illness severity, global improvement, and therapeutic response. The evaluation is done by clinicians, who is asked to rate the particular patient on these items on the basis of their own experiences with other patients with the same diagnoses and symptoms.

In the case of the present study, the improvement score was available, which ranged from 1 (*very much improved*) to 7 (*very much worse*). It represents the difference between the score at admission and that at the time of release. However, it is important to also state that the change can also be due to drug treatment – this is not specifically taken out in the wording of the item. Furthermore, scores only ranged between one and four, representing the positive change, respectively improvement, or the lack of change. Additionally, the code 8 is introduced, meaning that this change was not evaluable.

7.5.7.4. Brief Symptom Inventory (BSI).

The Brief Symptom Inventory, applicable for adults and adolescence starting at 13 years of age, was originally developed as a 90-item symptom checklist SCL-90-R by Derogatis (1992) and translated into German by Franke (2000). It consists of nine sub-scales and three global scores in order to assess patients' strain in the last seven days. The development has been characterized by various adjustments and changes based on specific demands of the respective studies conducted and is assumed to keep developing in the upcoming years as well. Table 23 includes all sub-scales and indices accessible through the BSI (Franke, 2000, p. 7).

Table 23

Summary of Sub-Scales of the Brief Symtpom Inventory, Number of Items and Descriptions

(Sub-)scale	Description
Scale 1: SOMA *(7 items)*	Somatization: distress and psychologic strain resulting from perceived bodily dysfunctions
Scale 2: ZWANG *(6 items)*	Obsessive-compulsive behavior: focus on thoughts, impulses, and behavior that the person does not perceive as changeable.
Scale 3: UNSI *(4 items)*	Interpersonal sensitivity: questions range from small social insecurity up to feelings of insufficiency; includes negative expectations with regard to communication and social behavior
Scale 4: DEPR *(6 items)*	Depression: questions ranging from sadness to serious depression; decreased interest in one's life in general, in motivation and energy
Scale 5: ANGS *(6 items)*	Anxiety: questions ranging from being nervous to deep anxiety, panic attacks, shaking or tension; feelings of concern and fear
Scale 6: AGGR *(5 items)*	Hostility: ranging from imbalance to hostility, irritability; aggression, resentment, and rage
Scale 7: PHOB *(5 items)*	Phobic anxiety: ranging from feeling threatened to massive phobic anxiety, stable and inappropriate fear with regard to a specific person, object or a situation; behavior of avoidance and flight
Scale 8: PARA *(5 items)*	Paranoid ideation: ranging from distrust and sense of inferiority to paranoid ideation; projection of thoughts, hostility, grandiosity, delusional deception, and fear of loss of autonomy
Scale 9: PSYC *(5 items)*	Psychoticism: ranging from mild feelings of isolation to psychotic episodes, perceptions ranging from biased and isolated lifestyle to hallucinations
GSI *(across all items)*	Global severity index (general psychologic strain and distress)
PSDI *(across all items)*	Positive symptom distress Index (measures the answer's intensity)
PST *(across all items)*	Positive symptom total (number of symptoms for which a distress exists)

Note. The original scale was developed by Derogatis (1992). In the present study, the German translation by Franke (2000) was applied.

For each of the nine sub-scales a scale score, represented by the mean score across the respective items of the scale, was calculated. The GSI is calculated similarly, by creating the respective mean scores after subtracting the number of missing scores. The PST score represents the sum of the tendencies of strain (i.e., number of items with a scores > 0; calculated for each scale) across the scales. Finally, the third global index (i.e., PSDI) can be reached by dividing the GS score (i.e., sum of the sum scores across the scales) by the PST score, which has been described above. Based on the aforementioned indices and scores, the respective T-scores can also be extracted in order to make individual scores comparable to a certain group of people.

This test is assumed to measure effects of psychotherapeutic interventions (for an overview of studies, see Franke, 2000, pp. 59-61), which was also the goal of the present study. For this purpose, it is recommended to use the change in the GSI score as it takes into account the high internal consistency of the whole scale. By definition, a person's stress is noticeable when the T-scores (i.e., the T-score of the GSI or the individual sub-scales) is equal to or exceeds 63.

For the present study, the following data were accessible: The mean scores and the T-scores of all 12 dimensions described in Table 23 above at two points in time: at admission to and release of the psychosomatic clinic. In addition, the differences of the T-scores at admission and release for all sub-scales were available.

7.5.7.5. Additional clinical data.

In addition to the diagnostic instruments described above, some additional data were made available for the present study. Based on all available data, the following were included in the present study:

- main and secondary diagnoses (based on the system of the ICD-10);
- date of admission and date of release;
- length of stay at clinic (in days);
- incapacity for work in total across the last 12 months (in weeks);
- number of previous inpatient treatments;
- outpatient psychotherapy at admission (response options: yes / no); and
- outpatient psychiatric treatment at admission (response options: yes / no).

7.5.7.6. Description of the clinical sample based on the additional clinical data.

On average, participants in the clinical sample of the present study received inpatient treatment between June 23rd, 2016 and December 20th, 2017 for a duration between 27 and 90 days (M = 49.28, SD = 13.26). On average, the incapacity for work within the last 12 months reached a length of 16.59 weeks (SD = 17.16 weeks). While 71.76% of participants did not have any previous inpatient treatment, 28.24% of participants reported that they have been treated in a clinic at least one time before. In particular, two (i.e., 2.35%) patients reported to have received inpatient treatment twice, while four participants reported three and one reported of four previous treatments. Of the patients whose data were available on this question, over half of the participants regularly had outpatient psychotherapy sessions before being admitted to the

clinic (i.e., 52.78%). With regard to previous outpatient psychiatric treatment, roughly one third (22.20%) of all participants answered wit yes. Finally, of all participants, only 28.75% did not receive any medication, while it is unknown for 5.00%. The remaining 67.00% did get different forms of medication during their stay at the clinic. The most frequent main diagnosis was the F33.1 (n = 32; i.e., 36.36%), the F32.1 (n = 23; i.e., 26.14%) and the F33.2 (n = 14, 15.91%). Remaining diagnoses also included those in the area F40, F41, F42, F43, F45 and F50. A detailed overview of the most frequent main and secondary diagnoses can be found as part of one of the research questions in the upcoming Results section (see chapter 8.2.3.5.).

7.6. Statistical Analyses

The following chapter summarizes all statistical analyses applied in the present study in order to address the main research questions and hypotheses stated above (see chapter 6). To offer a structured overview, all approaches and analyses are grouped based on their specific methodological nature and goals. Their focus is on the internal structure and validity of a construct or scale (chapter 7.6.1.), the identification of homogenous groups within the sample(s) (chapter 7.6.2.), differences between groups of participants on certain variables (chapter 7.6.3.), and relationships between various variables (chapter 7.6.4.). Finally, statistical analyses for the investigation of effects of third variables (chapter 7.6.5.) as well as for the construction of structural equation models (7.6.6.) are described. All descriptions also contain a list of assumptions that have to be met in order to conduct the particular analysis. Considerations about assumptions (chapter 7.7.) and confounding variables (chapter 7.8.) conclude this chapter.

7.6.1. Investigating a variable's (internal) structure.

This first section contains two methods that were applied in order to further analyze the internal structure of a variable: the exploratory (EFA) and the confirmatory factor analysis (CFA). Both are important procedures in the scale development research (e.g., DeVellis, 2017, pp. 153-204).

7.6.1.1. Exploratory factor analysis.

Exploratory factor analyses (EFA) are applied in order to determine different aspects or facets of an underlying construct (i.e., a latent variable), which cannot be measured directly. It groups different variables into factors based on similarities between those variables. Therefore, the main uses for EFA can be summarized as: "(1) to understand the structure of a set of variables

…; (2) to construct a questionnaire to measure an underlying variable …; and (3) to reduce a data set to a more manageable size while retaining as much of the original information as possible" (Field, 2009, p. 628). These steps are often applied in order to support construct validity of a certain questionnaire or test (Moosbrugger & Schermelleh-Engel, 2008). Among the numerous statistics program that can be used to conduct EFA, SPSS by IBM is used in the present study. Because it is an exploratory approach, no specific hypotheses are tested with this method.

The assumptions for conducting EFA are the following:

- sample size of at least 300 participants in total of five participants per variable included in the analysis (for a discussion of this aspect, see Field, 2009, p. 645-647);
- the measurement level of the variables should be at least interval;
- the correlations between variables should not be too low ($r < .30$) or too high ($r > .80$; for a discussion of literature related to this question, see Field, 2009, pp. 647-648). Too high correlations represent the problems of multicollinearity (i.e., very high correlations) and singularity (i.e., perfect correlations). While correlations between variables can be checked based on the correlation matrix in the SPSS output, it can also be investigated using the Bartlett's test (testing whether all correlations are significantly different from zero); and
- sampling data should be normally distributed. This is "most important if you wish to generalize the results of your analysis beyond the sample collected" (Field, 2009, p. 650).

7.6.1.2. Confirmatory factor analysis.

In comparison to the EFA described above, the confirmatory factor analysis (CFA) is applied to test whether a certain pre-determined structure of factors fits the respective data set of interest. It is often realized based on theoretical assumptions and already has a fixed number of variables and factors and a pre-defined relationship between different factors. While the EFA is a more experimental approach, the CFA is an approach that tests certain pre-stated hypotheses and a pre-defined factorial structure. Furthermore, it is possible to test various theoretical models and determine based on the model fit indices which fits the data the best. In most cases, also in the presented study, the maximum likelihood approach is applied. Whether the data fits the pre-defined structure is decided based on the validity of the model, which can be checked using certain indicators suggested in the literature (e.g., Lei & Wu, 2007). The most

commonly used indicators and their specific cut-off values for interpretation are the following (see also Hu & Bentler, 1999; Moosbrugger & Schermelleh-Engel, 2008, p. 319):

- χ^2 / df (good fit: .000 - 2.00; acceptable fit: 2.01 - 3.00),
- RMSEA (good fit: .000 - .050; acceptable fit: .051 - .080),
- CFI (good fit: .970 – 1.00; acceptable fit: .950 - .969), and
- NFI (good fit: .950 – 1.00; acceptable fit: .900 - .949).

It is embedded into approaches of Structural Equation Models (SEM; e.g., Borg & Staufenbiel, 2007, pp. 239-270) and therefore has to be conducted in specific statistic packages, such as SPSS AMOS. Before conducting a CFA, the following assumptions have to be checked:

- "a theoretical model is specified" (Moosbrugger & Schermelleh-Engel, 2008, p. 317), and
- the requirement that "for confirmatory evaluation of hypotheses using CFA, the data set applied should not be the same that was used to explroratorily generate hypotheses" (Moosbrugger & Schermelleh-Engel, 2008, p. 320).

7.6.2. Investigating homogeneous groups of people.

The second part of the statistical analyses aims at identifying groups of people that are similar on some specific variable. In particular, two methods are commonly used in the sciences: latent class analysis and hierarchical cluster analysis.

7.6.2.1. Latent class analyses.

Latent class analyses (LCA) are based on the assumption that variables are categorical or qualitative in nature, which makes people part of certain groups (i.e., latent classes; Geiser, 2011, p. 235), such as different personality types (Gollwitzer, 2007). In empirical research, it is often used to classify people or to test a specific model. The underlying data consists of various answers on a number of items from a questionnaire, for example. "Interindividual differences in answering patterns are explained through the allocation to latent classes with class-specific answering profiles" (Geiser, 2011, p. 235). In particular, by conducting LCAs, the following questions can be answered (Gollwitzer, 2007, p. 281):

1) How many classes of people exist?
2) Which class does a specific person belong to?
3) How many people can be grouped into the different classes?

Although it is unknown how many groups of people exist in the population, this number (question 1) has to be pre-defined in order to be able to conduct the analysis, while the remaining (or answers to questions two and three) can be generated based on the empirical data. The most common way described in the literature to define the number of groups or classes is by comparing different models. In order to determine the number of groups that fits the data best, the validity of the specific models is analyzed by using various criteria. Those can be grouped in three groups of indices: the absolute fit indices, the relative fit indices and information criteria.

- The absolute model fit shows whether the specified model can be reproduced by the data. Often applied are the likelihood-ratio-test and the Pearson-χ^2-Test. Significant results indicate a deviation between the model and the observed data in the data set. However, some restraints of these fit indices have to be kept in mind: If the sample size is too small, the resulting p-value can be incorrect, because the data do not follow a χ^2 distribution. Also, the power of this specific test is small given small sample sizes. One indication for cautious interpretation exists if both values differ significantly from each other for the same model.
- Due to these statistical difficulties and insecurities, relative model fit indices exist and can be used to evaluate a model's validity. The main difference with this approach is that the same indicators of different models are compared to each other. On the one hand, there are information criteria such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample-size adjusted BIC. In order to evaluate the model fit it is suggested to use the model with the lowest BIC value. On the other hand, there is the option to compare a model with X classes with a model with X-1 classes. In order to do this, the Bootstrap-Likelihood-Ratio-Difference test or the Vuong-Lo-Mendell-Rubin likelihood ratio test is often applied. A significant value reveals support for the fact that the model with X classes fits the data better.

Furthermore, in order to evaluate the quality of the classification, the entropy-measure is often used. This indicator can reach values between 0 and 1, with values close to 0 indicating low certainty and values close to 1 indicating high certainty of the classification (Geiser, 2011, p. 249). The reliability of the classification can also be tested using the "average latent class probabilities for most likely latent class membership (row) by latent class (column)" in the output. High reliability is indicated by values that are close to 1 in the main diagonal of this output (p. 250).

In order to answer questions two and three stated above, it has to be kept in mind that LCA is a technique referable to the item-response-theory. This means that whether a person belongs to a certain class is determined based on a certain probability (i.e., question two). In order to calculate this particular probability, two assumptions are made: Every person can be assigned to a specific group, but only to one group. Based on these probabilities, the respective group sizes can also be inferred (i.e., question three).

Because not many statistical programs are able to conduct LCAs, it has been decided to use MPlus in the present study (Muthén & Muthén, 1998-2012). Similar to factor analyses described above, there are also two ways of conducting LCA. In general, this method has an exploratory nature and aims at exploring a structure in the data, which is also how it is used in the presented study. However, the number of classes has to be pre-defined. In addition to a pre-defined theory as the basis of this analysis, the number of classes can also be defined by comparing different models. The confirmatory application of an LCA includes the fixation of various parameters based on assumptions about the particular structure of the data. In exploratory LCA these parameters are calculated empirically based on the respective data set (Gollwitzer, 2007). However, because his type is not applied in the present study it is therefore not explained in more detail at this point.

7.6.2.2. Cluster analysis.

Similar to factor analyses described above, cluster analyses are heuristic procedures that aim at classifying people and assign them to different groups or clusters (Backhaus, Erichson, Plinke, & Weiber, 2011). It is realized in a way "that the differences between the objects in one group … are as small as possible and the differences between clusters as big as possible" (Bortz, 1999, p. 547). Within the area of cluster analyses there is a hierarchical and a non-hierarchical type. The underlying procedures of both approaches are the following (see Bortz, 1999).

- Hierarchical procedures start with one cluster for each object. In a first step the differences between the clusters are analyzed and those two with the smallest distance (for variables measured on an interval level often measured using the Euclidian distance) are then combined. The final number of clusters is then reduced by one. This step is repeated until all participants are allocated to just one final cluster. In order to determine which number of clusters fits the data set the best, the elbow-criterion is applied. This procedure allows to

identify the suitable number of clusters through inspection of the resulting dendogram, which shows the resulting distances (or increases in error sum of squares) between clusters. In the literature diverse criteria based on which the different objects are merged are found. In the present study, the Ward-procedure is used, which aims at revealing the smallest increase in the final error sum of squares after merging procedures. It is said to reveal the best results (Bortz, 1999, p. 555). However, it is important to note that hierarchical cluster analyses have one big disadvantage: The process of merging objects cannot be revised, which limits the practical use of the results. It is therefore recommended to test and attempt to optimize the result with a non-hierarchical analysis as well.

- For a non-hierarchical procedure the number of clusters and the allocation of specific people to certain clusters already has to be pre-defined. The approach then aims at switching those affiliations based on a fixed criterion. It is completed once the structure cannot be improved further. Similar to the hierarchical procedures, there are different methods that can be applied within the area of non-hierarchical analyses as well. Because the non-hierarchical approach aims at improving the results revealed by the hierarchical procedure, the k-means-method will be applied in the present study. It aims at improving the structure that has been revealed by prior analyses. Based on balance points of the clusters and the Euclidian distance measures it aims at finding a solution in which the final position of objects is in a way that the distance to the balance point of its own cluster is the smallest compared to the distance to those of other clusters. In this procedure, the allocations can be revised at any time.

7.6.3. Investigating differences between groups.

In this section, different tests that aim at comparing two or more groups are described. Because these tests fall into the category of parametric tests, which require among others the assumption of normal distribution of the sampling data, non-parametric alternatives are also described. Those are of particular importance if variables are included in the analyses that violate this assumption. For all upcoming analyses, Cohen's f (Cohen, 1988) is applied as an indicator of effect size.

7.6.3.1. Independent-samples t-test.

The independent-samples t-test is applied when differences between groups are of interest to the researcher based on the mean scores on certain variables. While there is a paired-samples

t-test, which looks at differences between two time points, but in the same group of participants, the independent-samples t-test is of main importance for the present study. It analyzes differences on a dependent variable between two groups of people (in this case the two samples) and tests the following hypotheses:

H_o: The mean values of the two samples are the same.

H_a: The mean values of the two samples are different.

Before conducting an independent-samples t-test, which can be realized in the statistics program SPSS by IBM (2017), the sampling data has to be analyzed for the following assumptions (Bühner & Ziegler, 2017, p. 301; Field, 2009, p. 326):

- the sampling distribution has to be normal;
- data has to be measured at least on an interval level;
- the variances in the two populations of interests have to be roughly equal (homogeneity of variance);
- independent scores (which can be seen as fulfilled if scores come from different people).

The independent-samples t-test can be conducted using the statistics program SPSS by IBM (IBM, 2017).

7.6.3.2. Mann-Whitney-U test as the non-parametric alternative.

The Mann-Whitney test is a non-parametric test of differences between two groups, which is not affected by the violation of the assumptions of normal sampling distributions or the homogeneity of variance that are required in the independent-samples t-test. It is therefore often applied as a robust alternative approach for the independent-samples t-test. Furthermore, it can be applied with small sample sizes and with outliers.

> Other than the independent-samples t-test, the Mann-Whitney test uses ranks instead of the raw data values. Specifically, the data values are assigned ranks relative to both samples combined, and Mann-Whitney's test is designed to test whether observations in ne population tend to have higher values (and therefore higher ranks) than those from the other population. (Elliott & Woodward, 2007, p. 195)

Therefore, rather than testing mean values, this test analyzes distributions. Therefore, median values are often included when reporting the results of this test. It analyzes the following hypotheses (Elliott & Woodward, 2007, p. 196; Bühner & Ziegler, 2017, p. 326):

H_o: The two groups have the same distribution.

H_a: The two groups do not have the same distribution.
However, there is one assumption that has to be met in order to conduct the Mann-Whitney test: The data have to be measured on an ordinal measure, which can be seen as fulfilled with Likert scales (see Norman, 2010, p. 627).

7.6.3.3. Analysis of variance (ANOVA).

The analysis of variance (ANOVA) is applied when mean scores of more than two independent groups are compared to each other. It reveals more accurate results by controlling the probability of Type I errors that would occur when conducting several independent-samples t-tests. The result is an omnibus F-statistic that indicated whether an overall significant difference between the groups exist.

However, as was the case for the statistical tests above, the assumptions have to be checked before conducting the analysis. Those "are the same as for all parametric tests based on the normal distribution" (Field, 2009, p. 359), which are specifically:

- variances in each condition are similar;
- the observations are independent of each other;
- the dependent variable has to be measured on an interval scale;
- and the distribution within the different groups has to be normal.

In order to further gain information in addition to the omnibus F-value it is subsequently analyzed which of the groups differ significantly from each other. In order to do this, post hoc procedures are applied that represent pairwise comparisons, comparing the mean scores on a particular variable of interest between all available combinations (dependent on the number of groups). There are different post-hoc tests available for ANOVAs, which cannot be explained in detail at this point. However, it is important to state that they all control for the probability to make Type I errors. At the same time, however, it is important to consider the loss of power in doing this. One of the post hoc tests that "has good power and tight control of the Type I error rate" (Field, 2009, p. 374) is the Ryan, Einot, Gabriel and Welsch Q procesudre (REGWQ), which will be applied in the present study. However, when assumptions are violated, there are some different post hoc tests to be considered. In the present study, in particular, the different sample sizes are important to consider. For this situation, two example tests, which are suitable, are the Hochberg's GT2 and Gabriel's test. When sample sizes are different and the variances are equal, Hochberg's GT2 is an accurate way to conduct post hoc

tests (p. 374). If population variances differ, it is suggested to apply Gabriel's test (Field, 2009, p. 374).

Although the ANOVA is said to be a robust test when assumptions are violated, there are still some limitations when some assumptions are violated, such as unequal sample sizes, non-normality, and homogeneity of variance (for a more detailed description, see Field, 2009, pp. 359-360). Therefore, there is a non-parametric alternative that can be applied when assumptions are violated and that will be described in the following paragraph.

7.6.3.4. Kruskal-Wallis test as the non-parametric alternative.

In cases of violations of assumptions, such as non-normality, the Kruskal-Wallis test can be applied as well. It is the non-parametric alternative, is based on the chi-square distribution and uses ranked data to compare the different groups (Field, 2009, pp. 559-561). In order to subsequently compare the specific groups with each other (i.e., conducting post-hoc tests) different ways are suggested in the literature, one of which is the Dunn-Bonferroni test, which conducts pairwise comparison using Bonferroni correction (e.g., Dunn, 1964), which ensures that the Type I errors are not exceeding .05. In analyses using this method, only the Bonferroni-adjusted p-value is reported.

7.6.3.5. Analysis of covariance (ANCOVA).

By using analysis of covariance (ANCOVA), the effect of a continuous, additional variable, which has a relationship with the dependent variable, can be partialed out. By applying this method, it is possible to "see what effect an independent variable has after the effect of the covariate" (Field, 2009, p. 396). This can be used if particular variables are found to be cofounding variables that research wish to control for. It is very similar to the ANOVA described above; the only difference is that in those analyses, a covariate is included in the analysis. Before conducting ANCOVAs two assumptions have to be taken into consideration (see Field, 2009):

- independence of the covariate and the treatment effect, and
- homogeneity of regression slopes: With this assumption it is suggested that the relationship between the covariate and the dependent variable is the same in all the different groups. If this relationship would differ across groups, this assumption is not met and the results will be inaccurate. This assumption can be tested by "plotting scatterplots for each experimental

condition with the covariate on one axis and the outcome on the other" (Field, 2009, p. 399).

7.6.4. Investigating relationships between variables.

The upcoming section includes different approaches that aim at identifying relationships between variables. In particular, these are the Pearson correlation coefficient, its non-parametric alternative method (Spearman's correlation coefficient), partial correlation, the chi-square test of independence, and (multiple) linear regression analyses.

7.6.4.1. Pearson correlation coefficient.

Correlational analyses are applied in order to investigate whether two variables are related to each other. This relationship can either be positive or negative, indicated by resulting coefficient scores ranging between -1.00 and +1.00. In a positive correlation, if one variable increases, the second variable does as well, while in a negative correlation, if one variable increases, the second one decreases. In order to interpret the strength of the relationship (and also the effect size), it has been said that the closer a score is to 1, the stronger is the relationship between the two variables (e.g., Bühner & Ziegler, 2017). A score of .10 is interpreted as a small effect, one of .30 as medium and .50 as a strong effect (p. 637). With this analysis, the following hypotheses are tested:

H_o: The relationship between the two variables is not statistically (significantly) different from 0.

H_a: The relationship between the two variables is statistically (significantly) different from 0.

The assumption to conduct a correlation analysis are the following:

- a linear trend has to be observable in the data (using graphic representations, such as the scatter plot);
- the data have to be measured on an interval level;
- normal distribution of the sample data (or a large sample).

However, it is important to keep in mind that no decisions about causality can be made based on a correlation analysis. Also, no indications about the direction of causality can be made. For example, there is the possibility that a third variable, which affects both.

7.6.4.2. Spearman's correlation coefficient.

While the Pearson product-moment correlation coefficient can be applied with normally distributed data, the Spearman correlation coefficient is applied when violations for the Pearson correlation coefficient exist (e.g., data are not normally distributed). It is a non-parametric test and "works by first ranking the data …, and then applying Pearson's equation … to those ranks" (Field, 2009, p. 180). In the present study, it is applied as the non-parametric alternative to the Pearson correlation coefficient and is used for variables that are not normally distributed.

7.6.4.3. Partial correlation.

Partial correlations are very similar to the aforementioned Pearson correlation coefficient with the only difference that "the effects of a third variable are held constant" (Field, 2009, p. 186). It can be used to investigate a relationship between two variables while controlling for a third variable that is known to also be related to these two measures. In addition to the assumption of the correlation coefficient described above, there is one more assumption to take into consideration when planning to conduct partial correlation analyses: The covariate does not only have to be related to the remaining two variables, but also has to be measured on a continuous level.

7.6.4.4. Pearson's chi-square test.

Pearson's chi-square test is applied if a relationship between two variables measured on a categorical level is of interest for a particular research question. This is analyzed "based on the simple idea of comparing the frequencies you observe in certain categories to the frequencies you might expect to get in those categories by chance" (Field, 2009, p. 688). There are two assumptions that have to be met prior to conducting a chi-square test. Those are:

- independence of data: It is important "that each person, item or entity contributes to only one cell of the contingency table" (Field, 2009, p. 691), and
- "the expected frequencies should be greater than 5" (p. 692).

7.6.4.5. (Multiple) linear regression analyses.

Regression analyses are applied in order to test whether one independent variable (simple regression) or more than one variable (multiple regression) can predict an outcome (or dependent) variable significantly. Although it is mainly applied in longitudinal and experimental data, in order to analyze causality and the magnitude of the prediction, it can also

be used with survey data (Bühner & Ziegler, 2017; Field, 2009). Within this regression model each variable has a specific weight (i.e., called a standardized regression weight and indicated by β, which is also the effect size). β-scores of around .10 can be seen as a small effect, β = 0.30 is interpreted as a medium and β=.50 as a high effect size (Cohen, 1988). All of the predictor variables explain a certain variance within the outcome variable, which is described as R^2 (the related effect sizes are f^2, while a score of .02 is considered a small effect size, .15 a medium and .35 a strong effect size).

Before conducting a liner regression analysis, the following assumptions have to be fulfilled (Field, 2009, pp. 220-221):

- the predictor variable(s) must be quantitative or categorical; the outcome variable must be quantitative (i.e., measured on an interval level), continuous and unbounded,
- there should be no zero variance in the predictor;
- no perfect multicollinearity, which implies no perfect linear relationship between predictors;
- predictors should be uncorrelated to other variables, which have not been included in the analysis;
- homoscedasticity, which implies that at each level of the predictor variable(s), the residual variance should be constant;
- errors should be independent (to check this assumption, the Durbin-Watson test can be applied, which tests whether adjacent residuals are correlated; the statistic should be between 1 and 3, but is highly dependent on the model defined);
- normally distributed errors;
- independence, implying that each variable in the outcome variable is from a separate entity;
- linearity (the modelled relationship is linear).

7.6.5. Investigating an effect of a third variable on a relationship between the independent and the dependent variable.

In order to test whether a third variables can have an effect on a relationship between two variables, moderation and mediation analyses are often conducted.

Moderation analyses are applied, if it is assumed that a third variable has an effect on a relationship between two variables of interest. In particular, “the effect of X on some variable Y is moderated by W if its size, sign, or strength depends on or can be predicted by W”, which

in the Figure X below is called M (Hayes, 2018, p. 220). A model of a moderation is depicted in Figure 27 below.

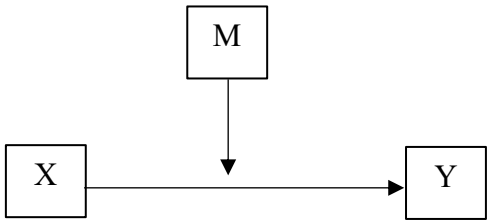

Figure 27. Moderation model with X representing the independent variable, Y the dependent variable and M the moderator.

In order to analyze this effect, regression analyses are often conducted. Specifically, an interaction effect between the independent and the moderator variable is added to the regression model and the change in the result is observed and reported.

Assumptions of moderation are similar to the ones of regression and among others include in particular the following:

- both variables X and M have to be able to predict Y. In particular, they have to cause Y;
- linearity: The relationships between X and M to Y have to be linear in nature;
- homogeneity of variances of the variables X and Y.

In comparison, mediation analyses are applied in scientific research when it is of interest "how" two variables are related to each other (Hayes, 2018, p. 78). In particular, it is "used to evaluate evidence from studies designed to test hypotheses about how some causal antecedent variable *X* transmits its effect on a consequent variable *Y*" (p. 78) and answers the question "What is the mechanism … by which *X* influences *Y*?" (p. 78). Figure 28 below depicts such a simple mediation model, in which "two pathways by which X can influence Y" (p. 79) can be observed: The path from X to Y directly, called the direct effect, and that from X to Y through the mediator M, which is called the indirect effect. One method to calculate the indirect effect is the bootstrapping method in order to get bootstrap confidence intervals (Hayes, 2018). Using this method "the original sample of size *n* is treated as a miniature representation of the population originally sampled. Observations in this sample are then 'resampled' *with replacement*, and some statistic of interest is calculated in the new sample size *n* constructed through this resampling process" (pp. 97-98). One statistics program that offers a way to follow

this method and is also is used in the present study, is the PROCESS macro for SPSS developed by Hayes (2018).

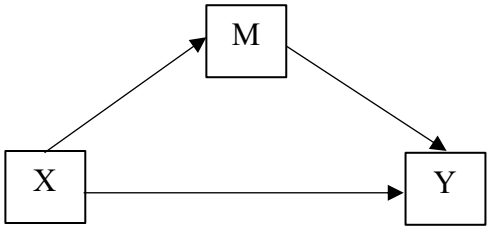

Figure 28. Simple mediation model with X representing the independent variable, Y the dependent variable and M the mediator.

7.6.6. Modeling causal relationships: Structural-equation modeling.

Structural Equation Modeling (SEM) is often applied in scientific research to test "a set of qualitative hypotheses based on theory or results of empirical studies" (R. B. Kline, 2016, p. 10) and to investigate the strength of these specific effects of interest based on a certain data set. These models are confirmatory, as researchers have to predefine specific directions of effects, but at the same time also exploratory, because the model might have to be modified to fit the specific data. This generating and modifying process "is probably the most common and occurs when an initial model does not fit the data and is subsequently modified" (p. 11). One highly discussed issue in SEM is the sample size that is required. Although there are many studies investigating the sample size needed, "a meaningful absolute minimum sample size" has been suggested to be 200 (p. 16). However, the final number depends on the complexity of the model, missing data, the distribution of the data and other aspects. Looking through the literature, it seems to be generally accepted that sample sizes should not be smaller than N = 200. One computer program that enables conducting SEM is AMOS by SPSS (Arbuckle, 2014). Because the aforementioned CFA (see section 7.6.1.2.) was realized using the same approach, the fit indices described above are applied as well (e.g., Hu & Bentler, 1999).

7.7. Some Considerations about Dealing with Assumptions

For all statistical tests that will be conducted in the present projects, the respective assumptions will be checked on the specific data set (i.e., sample) it will be applied to. While throughout the beginning of the Results section more detailed information is given about whether certain assumptions are met, those descriptions will become shorter throughout the section as most

assumptions are repeated. Particularly, the focus is on assumptions that are not met rather than those that are met. However, looking at the data set(s) and considering the nature of the sampling data, there are reasons to expect that some assumptions might not be met. One of these reasons is the clinical sample, which naturally shows some specific characteristics. Therefore, the following paragraphs will describe some general rules about how to deal with violated assumptions that are widely accepted in the scientific field. They are the background of the upcoming data analysis in the present study.

7.7.1. The assumption of normality.

The first assumption represents the normal distribution of the sampling distributions, which is an important condition to conduct correlation, regression analyses or comparisons of mean scores (i.e., t-tests and ANOVAs). Statistically, this can be checked applying the Kolmogorov-Smirnov or Shapiro-Wilk test (e.g., Field, 2009, p. 144). However, one limitation of these tests is that large sample sizes might lead the statistical tests to become significant easily. It is therefore advised to use the statistical test, but also analyze the plots and descriptive statistics (i.e., skewness and kurtosis) to evaluate how far away from a normal distribution the distribution in the present data set is (e.g., Field, 2009, p. 144). In cases of substantial deviation of normality, various researchers advise transferring the data (i.e., by using the logarithm function) to a normal distribution (e.g., Altman & Bland, 1995) or applying statistical methods that are more robust to data that do not meet those assumptions.

In order to determine whether substantial deviations occur, the skewness and kurtosis scores were transferred into standardized z-scores that have a mean of 0 and a standard deviation of 1 and subsequently tested for significance. For this purpose, the following cut-off values were applied: absolute values greater than 1.96 are significant on a p-level of .05, values above 2.58 are significant on a p-level of .01 and above 3.29 are significant on a p-level of .001 (see Field, 2009, p. 139). Because the sample sizes of the two samples were not big (following the definition of big as $N > 200$), it was feasible to check those scores and determine whether they were bigger than 1.96. The formulas for the *z*-standardization is:

$$Z_{\text{skewness}} = \frac{S-0}{SEskewnee} \text{ and } Z_{\text{kurtosis}} = \frac{K-0}{SEkurtosis}$$

with S and K representing the Skewness and Kurtosis-scores respectively and SE representing the particular standard error. However, on the other side, it is important to state that it has been

suggested in various statistics books (e.g., Elliott & Woddward, 2007; Pallant, 2007) and scientific papers
(e.g., Norman, 2010) that violations of this assumption should not affect the analyses significantly. This is based on the central limit theorem, suggesting that "in big samples the sampling distribution tends to be normal anyway – regardless of the shape of the data we actually collected" (Field, 2009, p. 134). It suggests that parametric tests can still be conducted, even if the sampling data are not normally distributed. Non-parametric tests that can be applied as alternatives when assumptions are not met, such as Spearman rho or Kruskal-Wallis are even described as "frozen in time and [are] used only rarely. They can handle only the simplest of designs" (Norman, 2007, p. 627). The robustness of tests like ANOVA, t-test, correlation and regression analyses with regard to non-normality, skewness, unequal variances and the nature of the scale has been supported in various studies in the last 80 years (for an overview, see Norman, 2010, p. 629).

Based on this partially antithetic discourse in the statistics literature, the following procedure was applied in the present study: At first, the data was analyzed statistically using the Kolmogorov-Smirnov test. In cases of a significant results, p-p-plots as well as the descriptive statistics were also inspected and considered, in particular the values of kurtosis and skewness. In order to interpret whether these values significantly deviated from 0 (which would be the value for both indicators in the normal distribution), both values were transformed into *z*-scores. If the revealed absolute scores were above 1.96, the deviation was considered as significantly different from a normal distribution (Field, 2009).

In cases, in which the Kolmogorov-Smirnov test revealed a significant result and the standardized scores of kurtosis and skewness suggested a significant deviation from normality, the data were either transformed (i.e., using the log-transformation) or an alternative non-parametric statistical approach was applied that was not affected by this violation. This was done for each analysis individually and reported in the Results section. Nevertheless, in addition, the parametric test on the original data (sets) were also reported in order to fulfill the demands of those scientists suggesting robustness to violations of various assumptions (for an overview, see Norman, 2010).

7.7.2. The assumption of homogeneity of variance.

This assumption suggests a stable variance of one variable on each level of the other variable(s). In order to test for this assumption, Levene's test (e.g., Levene, 1960) can be calculated in the statistics package SPSS, which tests for the null hypothesis that the variances of two groups are equal. If variances are unequal, the degrees of freedom have to be adjusted and consequently a different t-distribution based on a different number of degrees of freedom is applied in order to test for a critical value (e.g., Bühner & Ziegler, 2017, p. 303). In addition to the results revealed if the assumption is met, SPSS also provides adjusted degrees of freedom and the respective results in case of a violation of this assumption (i.e., if $p < .05$ for the Levene's test).

Theses adjusted values were also applied in the present study, if no equal variances could be assumed in the present sample(s) and data set(s). As it was the case with the assumption of normality, tests for homogeneity of variances were applied for each analysis separately and also addressed in the respective Results section.

7.7.3. Handling outliers.

Outliers are an important aspect to consider before conducting any analyses since they might be responsible for skewness and kurtosis of the data as well as heterogeneity of variance (e.g., Field, 2009). Common methods of dealing with outliers are removing these cases, transforming the data, or changing the score in various ways (for an overview of the different methods, see Field, 2009, p. 153). For the present study, this aspect was particularly relevant because of the specific characteristics of the clinical sample. For example, an extremely high value on the sub-scale measuring Depression on the DASS-scale (Nilges & Essau, 2015) might have been an outlier, but at the same time relevant information for the present study. Taking this participant out would have significantly changed the nature and characteristics of this sample. For the non-clinical sample, on the other hand, the opposite was true: Too extreme values might decrease the difference between both samples. Therefore, if there were participants, who were outliers in more than one (sub-)scale, and at the same time excluding those cases would have led to an improvement in the scale (i.e., changing the skewness and kurtosis in a way that the distribution meets the requirements of a normal distribution), they were taken out of the data set. Adjustments of scores were not viewed as feasible and effective in this study, because it would have changed the answering pattern and therefore nature of the particular case without knowing

whether those adjustments represent the participant's true opinion and feeling. Which method was applied exactly was decided based on the nature of the sample on a certain variable or multiple variables in relation to a specific research question or hypothesis.

7.7.4. Handling missing data.

After conducting analyses on missing data as described above (chapter 7.3.), there were still some missing values present in both data sets. In the upcoming statistical analyses, they are addressed by applying the "pairwise or analysis-by-analysis basis, which means that if a participant has a score missing for a particular variable or analysis, then their data are excluded only from calculations involving the variable for which they have no score" (Field, 2009, p. 177). It was decided to apply this approach as it offers an approach that maximizes the use of data that are available in the data set. Consequently, this might mean a change in sample size for certain analyses which include missing data. However, this is documented comprehensively on the basis of the degrees of freedom reported as part of the results of the particular statistical test.

7.8. Some Considerations about Dealing with Confounding Variables

Despite various approaches and definitions of the word *confounding*, one popular conceptualization is the one repeatedly found in psychology: "Confounding is sometimes informally described as a mixing of effects of extraneous factors (called confounders) with the effect of interest" (Greenland & Morgenstern, 2001, p. 189). This, in turn, would lead to the question whether the relationships that are investigated do reflect the existing relationship or whether a third variable is responsible for this effect. It represents "an inferential problem in `construct validity` and is often used in psychology" (p. 190).

In order to determine whether confounding variables might be present in a specific study, it is important to gain knowledge about the construct of interest (i.e., in this case SPS) and investigate existing studies in order to identify possible confounding variables, which will be described in more detail in the following chapter.

7.8.1. General considerations about confounding variables in the present study.

In order to determine whether specific variables, in this case particularly demographic variables, were possible confounding variables, the correlation matrix of those variables with

all measurements included in the present study was investigated. In particular, only correlation coefficients bigger than .30 were considered and reported at this point since everything lower than this is interpreted as a small effect (Bühner & Ziegler, 2017). Inspecting the results, only two correlations became significant:

- In the clinical sample, the correlation between the particular school function and social withdrawal (a sub-scale of the measurement of dysfunctional cognitions) revealed a significant result ($r = .33$, $p < .05$). School function was able to explain a significant amount of variance within the variable of Social withdrawal ($\beta = .33$, $t(58) = 2.65$, $p < .05$; $R^2 = .09$, $F(1, 58) = 7.02$, $p < .05$). However, this result has to be interpreted carefully due to the relatively big amount of missing values on that question (i.e., which were around 50% of all available participants). Based on these circumstances, which do not allow a valid and reliable result, this result was not taken into consideration in further statistical analyses;
- with regard to the non-clinical sample, the correlation between school type and common organization (i.e., one sub-scale of the measurement of forms of collaboration) also revealed a significant result ($r = .31$, $p < .01$; $\beta = -.31$, $t(192) = -4.45$, $p < .001$; $R^2 = .09$, $F(1, 192) = 19.77$, $p < .001$).

These demographic variables (i.e., of functions and school type) had to be controlled for when conducting analyses that included the specific scales and the respective sample in order to take possible confounding effects into account. Details within the particular analyses. Correlation coefficients have also been checked with transformed and the adjusted data set as well as using Spearman's correlation coefficient and the results stayed similar, no additional correlation reached the threshold of .30 and statistical significance.

In a second step, knowing that particular function and the school type have an influence on the variables of interest in the present study, it had to be analyzed whether these two variables differed between the two samples. This was particularly important for those research questions that focus on a comparison of the two samples on various variables. Summarizing the results stated as part of the demographic description of the study in chapter 7.4, it was found that both samples significantly differed in both of these variables. However, due to the amount of missing values on the question about teachers' school function, this influence was not interpreted as reliable and valid and therefore not taken into account. However, when comparing both samples on the respective variables stated above, the possible confounder

school type had to be controlled for. A s was the case in the last analyses, the procedure is described in the respective analyses.

The same approach was taken considering the additional clinical data available for the clinical sample. Parametric and non-parametric tests revealed that the following relationships between sociodemographic and clinical data became significant and therefore had to be considered (i.e., controlled for) in further statistical analyses.

- Patients' gender revealed a significant relationship with the sub-scale Somatization of the PHQ measurement at admission (r = -.33, p < .01; r_{Sp} = -.34, p < .01) and release (r = .36, p < .001, r_{Sp} = .37, p < .001). It furthermore was related to the number of previous psychiatric outpatient treatments at admission (r = .44, p < .01; r_{Sp} = .45, p < .01).
- The function teachers had at school had a significant influence on the sub-scale Obsessive-compulsive behavior of the BSI instrument at admission (r = .34, p < .05, r_{Sp} = .31, p < .05) as well as the sub-scale interpersonal sensitivity at admission (r = .36, p < .05; r_{Sp} = .37, p < .05). Similarly, it was related to the number previous psychotherapeutic outpatient treatments as revealed by the non-parametric test (r_{Sp} = .45, p < .05). The significant result of the correlation between school function and the sub-scale PST (i.e., of the BSI instrument) at admission was disregarded at this point (r = .34, p < .05) due to the fact that assumptions are not met. However, as was already the case in the section above, this result has to be interpreted carefully due to the amount of missing values on that question.
- Finally, there was a significant correlation between the respective school type teachers work in and the number of previous outpatient psychiatric treatments at admission (r = .40, p < .05; r_{Sp} = .40, p < .05).

However, it is important to note the high number of missing scores (which were around 30%) for the question with regard to whether patients received outpatient treatment before admission to the clinical as well as the specific number of therapies. Therefore, this result cannot be seen as reliable and valid and therefore was not considered in further analyses. Similarly, as was already described above, the number of missing values for the question about the function teachers had at school also revealed a high percentage (around 50% when only considering the participants of the clinical sample for which more data was available). Therefore, these correlation coefficients cannot be seen as valid and reliable and these possible confounding variables were not considered in further statistical analyses.

Therefore, summarizing these findings, two aspects will be taken into account in the upcoming statistical analyses, which are the correlations between gender and Somatoform disorders (i.e., of the PHQ measurement) at admission and release.

7.8.2. Confounding variables in research on sensory-processing sensitivity: Age and gender.

In research on SPS, two variables have been stated repeatedly as possible confounders:

- Although there is no reason to assume that sensitivity would be different between boys and girls at birth (E. N. Aron & Aron, 1997, p. 356) and the HSP scale has been developed in a way that critical items, which would lead to a significant different answering pattern between men and women, were taken out of the scale (E. N. Aron et al., 2012, p. 272), those differences are still found. One explanation for these differences has been found in cultural expectations and norms. In Western cultures, for example, men are not accepted to be more sensitive (e.g., E. N. Aron & Aron, 1997, pp. 356-357). Gearhart (2012) was able to support this assumption empirically by investigating highly sensitive men and their higher gender role stress due to not being conform with American social norms.
- A second issue reported is age. Compared to the first issue, there is not much statistical support of this fact. However, it is assumed that specific wording of items might lead to men and older people agreeing less and answering differently than women (E. N. Aron & Aron, 1997).

As a way to balance out this effect, measures were taken to control for these two variables from the beginning. In most cases, this was done by including age or gender as a covariate into the analyses or by investigating interaction and moderation effects. In almost all cases however, the effects were either non-significant or they did not change the particular results (e.g., E. N. Aron et al., 2005, p. 186; A. Aron et al., 2010, p. 223). The only exception in these studies (i.e., the study by E. N. Aron et al., 2005), however, was the interaction with childhood, which did not play an important role in the present study and will therefore not be considered in more detail at this point.

A second possibility is aiming at choosing participants in a way that the distribution of gender and gender across decades of age is equal (E. N. Aron et al., 2012, p. 272).

Lastly, it is important to note that there are numerous studies in which age and gender differences are not taken into account at all (e.g., Gerstenberg, 2012; Hedden, Ketay, Aron, Markus, & Gabrieli, 2008; Jagiellowicz et al., 2011; Liss et al., 2005; Smolewska et al., 2006; Sobocko & Zelenski, 2015).

7.8.3. Dealing with age and gender (as possible confounders) in the present study.

In the present data sets, the correlations between SPS and gender or age did not reach the set threshold of .30 (i.e., in the clinical sample r_{gender} = -.22, $p < .05$ and r_{age} = .14, n.s.; in the non-clinical sample: r_{gender} = -.21, r_{age} = .26, ps < .01; in the total sample: r_{age} = .34, $p < .01$; r_{gender} = -.23, $p < .01$). The results did not change significantly when calculating the Spearman correlation coefficient as the non-parametric alternative. Furthermore, age and gender were not able to explain a statistically meaningful (i.e., based on the aforementioned threshold of r = .30) amount of variance within SPS in both samples.

8. Results

The following chapter describes the results of the present study. After a section stating findings of preliminary analyses, it addresses all research questions and hypotheses that were stated in chapter 6. For a better overview and structure of the results, the previous order of research questions is followed.

8.1. Preliminary Analyses and Results

Preliminary analyses and results, which are the basis for all upcoming analyses, including three areas: The comparison of the clinical and the non-clinical samples on all psychological variables included in the present study, the internal structure and validity of the scale measuring characteristics of the teaching profession, and the differences between the two samples regarding their scores on the SPS scale.

8.1.1. Comparing both samples on relevant psychological variables.

Comparing both samples on different stress-relevant personal psychological variables represents an important basis for all upcoming analyses. The is because further analyses were conducted based on the assumption that they did not only differ significantly from each other, but also differed in a way that the clinical sample shows a pattern that can be interpreted as

more dysfunctional than the non-clinical sample based on previous research studies. The following research question and hypotheses were tested as part of the preliminary results.

Research question 0.1: Can the differences between clinical and non-clinical data regarding variables of psychological well-being and other stress-related variables found in prior studies be replicated in the present study?

Hypothesis 0.1A: Participants in the clinical sample show significantly lower mean scores on the scale measuring work-life balance than the non-clinical sample.

Hypothesis 0.1B: Participants in the clinical sample show significantly lower mean scores on measures of self-efficacy than the non-clinical sample.

Hypothesis 0.1C: Participants in the clinical sample show significantly higher mean scores on measures of dysfunctional cognitions than the non-clinical sample.

Hypothesis 0.1D: Participants in the clinical sample show significantly higher mean scores on measures of coping strategies that are found to be dysfunctional (e.g., social withdrawal) and lower mean scores on measures that are found to be functional (e.g., relaxation) than the non-clinical sample.

Hypothesis 0.1E: Participants in the clinical sample show significantly higher mean scores on measures of psychological well-being than the non-clinical sample.

This step offered a preliminary look at some of the assumptions (i.e., the normality assumption) and some descriptive measures of the data set prior to conducting further statistical analyses. The assumptions of an independent-samples t-test are the existence of normal distribution, that data are measured at least on an interval level, the presence of homogeneity of variance, and the confirmation of independent scores (Field, 2009; Bühner & Ziegler, 2017; see chapter 7.6.3.1.). Because the data included two independent groups of people, the assumption regarding independency of scores was fulfilled. Similarly, all instruments were measured on a metric level, which also was in line with the measurement assumption (i.e., that data are at least interval). The first step was then to check for the distribution of all variables of interest.

Appendix C includes a summary of results to the question about whether all variables follow a normal distribution based on the original data set (Table C1), whether they can be transformed into a normal distribution and what implications this would have for the comparison of mean scores between the two samples, which was the original goal of this section. Particularly, it was found that some variables (e.g., scores on the variable of self-efficacy in the clinical sample) follow a normal distribution, while others did not (e.g., in the non-clinical sample). For variables that did not follow a normal distribution, different transformation methods were applied and only some cases were subsequently normally distributed (e.g., using the square root transformation on the variable of risk avoidance in the non-clinical sample). However, there are cases in which no type of transformation was successful (e.g., scores on the variable of work-life balance in the clinical sample), which led to the decision to apply a non-parametric alternative statistical test. In the non-clinical sample five outliers were found that revealed extreme values on the variable of self-efficacy among some others. Excluding these outliers revealed a normal distribution. No additional participants or values were excluded. The results of normality based on this adjusted sample size are displayed in Appendix C as well (i.e., Table C2).

After checking the assumption of normality on all variables of interest, the respective statistical tests were applied (i.e., independent-samples t-test or the Mann-Whitney-U test). For the sake of completeness and in order to follow recent discussions in the statistics literature (e.g., Elliott & Woddward, 2007; Norman, 2010; Pallant, 2007), both tests were applied for all variables. The following table (Table 24) lists all variables, the mean and standard deviation scores for both samples as well as the results of the respective test. Regarding Depression, scores on the respective DASS sub-scale (Nilges & Essau, 2015) were applied since it is the only scale for which scores of both samples were available.

Table 24

Summary of Means, Standard Deviations and Statistical Differences between the two Samples across Stress-Related Variables

Variable	Mean (M), Median (Mdn) and Standard deviation (SD)		Statistical test and effect sizes (Cohen's d / Hedges' g)
	Clinical sample (n = 130)	Non-clinical sample (n = 189)	
Self-efficacy	M = 2.74 SD = 0.46	M = 3.00 SD = 0.41	t(258,19) = -5.91*** g = 0.60
Work-life Balance	Mdn = 2.40 M = 2.61 SD = 1.10	Mdn = 4.00 M = 3.73 SD = 1.15	U = 5836***, d = 1.00 t(317) = -8.71*** g = 0.99
Dysfunctional cognitions			
Dependency	M = 3.69 SD =0.86	M = 3.51 SD = 0.73	t(317) = 2.01*, g = 0.23
Internalization of failure	M = 3.38 SD = 1.05	M = 2.93 SD = 0.84	t(204,707) =3.99*** g = 0.48
Depreciation and failure	Mdn = 2.63 M = 2.65 SD = 1.06	Mdn = 1.75 M = 2.00 SD = 0.93	U = 7743.50*** d = 0.66 t(253,235) = 5.72*** g = 0.66
Perfectionism	Mdn = 3.50 M = 3.44 SD = 1.01	Mdn = 3.25 M = 3.14 SD = 0.87	U = 9718.50**, d = 0.36 t(317) = 2.83**, g = 0.32
Avoidance of social support	Mdn = 2.00 M = 2.21 SD = 1.02	Mdn = 1.50 M = 1.74 SD = 0.74	U = 8885***, d = 0.48 t(220,64) = 4.59*** g = 0.54
Risk avoidance	[1]M = 1.53 SD = 0.29	[1]M = 1.42, SD = 0.24	t(238,37) = 3.69*** g = 0.42
Coping strategies			
Relaxation	[1]M = 1.65 SD = 0.27	M = 3.31 SD = 0.83	t(243,066) = 25.42*** g = 2.51
Social withdrawal	Mdn = 3.33 M = 3.30 SD = 1.14	Mdn = 2.33 M = 2.44 SD = 1.04	U = 7118.50*** d = 0.77 t(317) = 6.95*** g = 0.80
Control of reaction	[1]M = 1.40 SD = 0.27	M = 3.66 SD = 0.68	t(262,868)=-41.61*** g = 4.10
Proactive problem solving	M = 3.53 SD = 0.72	M = 3.92 SD = 0.63	t(317)=-5.01*** g = 0.58
Exploration of positive experiences	M = 2.69 SD = 0.97	M = 3.44 SD = 0.94	t(317)=-6.96*** g = 0.79
Resignation	M = 3.21 SD = 0.99	[1]M = 1.51, SD = 0.28	t(143,797)=19.16*** g = 2.55

(continued)

Variable	Mean (M), Median (Mdn), and Standard deviation (SD)		Statistical test and effect sizes (Cohen's d / Hedges' g)
	Clinical Sample (n = 130)	Non-Clinical Sample (n = 189)	
Psychological Well-being			
Depression	*Mdn* = 2.29 *M* = 2.36 *SD* = 0.88	*Mdn* = 1.29 *M* = 1.50 *SD* = 0.58	U = 5001***, *d* = 1.17 *t*(207,027) = 9.84*** *g* = 1.20
Anxiety	*Mdn* = 1.71 *M* = 1.86 *SD* = 0.71	*Mdn* = 1.14 *M* = 1.30 *SD* = 0.45	U = 5549***, *d* = 1.05 *t*(199,253) = 8.06*** *g* = 0.98
Stress	*M* = 2.51, *SD* = 0.76	[2]*M* = 0.62, *SD* = 0.32	*t*(160,888)=26.66*** *g* = 3.48

Note. Mdn = Median; M = Mean; SD = Standard deviation; U = Mann-Whitney-U test was applied, t = independent samples t-test was applied; n.s. = not significant.
*significant on a level p < .05; **significant on a level p < .01; ***significant on a level p < .001.
[1]this sample was transformed using the square-root-transformation in order to conduct the independent t-test analysis; [2]this sample was transformed using the log-transformation in order to conduct the independent samples t-test.

As shown in the table above, teachers in the two samples differed significantly on their mean scores on all measurements applied in the present study. Regarding the nature and the direction of the difference the hypotheses stated prior to the analyses were supported: The clinical sample generally revealed higher scores on variables measuring psychological ill-health, dysfunctional cognitions, and those coping strategies that are defined less effective in the existing literature (e.g., Resignation and Social withdrawal). The effect sizes Hedges' g (for the independent samples t-test) and Cohen's d (for the Mann-Whitney U test) both indicated only a few single differences with small effect sizes, particularly within the sub-scales measuring dysfunctional cognitions (e.g., the sub-scales Dependency or Perfectionism). The majority of differences, however, revealed medium to large effects (e.g., the sub-scale measuring the coping strategy Proactive problem solving) based on the common thresholds for interpretation (small effects = 0.20; medium effects = 0.50 and large effects = .80; see Bühner & Ziegler, 2017, p. 320).

8.1.2. Exploring the internal structure of the scale measuring characteristics of the teaching profession.

Research question 0.2: How many factors can be extracted when including all items of the newly developed instrument measuring specific workplace characteristics into one analysis?

In this second part of preliminary analyses, an EFA (i.e., principal component analysis) was conducted to determine the number of factors that can be extracted based on the measured characteristics of the teaching profession. Those factors would then represent the different underlying variables that teachers would in their professional lives that are measured with the items included in this study's questionnaire. To reach the required sample size to conduct a factor analysis and to find results that are applicable to both samples, it was conducted on the data of both samples. A total of 319 participants fulfilled the requirement of having at least five participants per variable. In this study, the characteristics were measured by 43 variables, which would lead to a minimum required sample size of 215 participants (for a discussion of this aspect, see Field, 2009, pp. 645-647). No data exist showing a relationship between these characteristics, thus, an orthogonal rotation (i.e., Varimax) was applied.

As was the case in chapter 8.1.1., the underlying assumptions were tested before conducting the analysis. Those include:

- the measurement of the variables, which should be at least measured on an interval level: This was fulfilled in the present sample, because variables were measured on a Likert scale (ranging from 1 (*does not apply at all*) to 4 (*totally applies*);
- checking the correlation matrix for correlations that are too high or too small, no coefficients above .80 were found. Conversely, many coefficients reached values below 0.30. In order to check whether the correlations were large enough to apply a principal component analysis, Bartlett's test of sphericity was conducted. The result was significant ($\chi^2(903) = 4288.50$, $p < .001$) and indicated a sufficient size of correlations. Furthermore, the Kaiser-Meyer-Olkin measure revealed a result of .82, which can be interpreted as good according to Field (2009, p. 647). Additionally, all KMO values for individual items were greater than .50, which is defined as the appropriate threshold (e.g., Field, 2009);

- because the data and results were not assumed to be generalizable in the present study, due to the use of a clinical sample, the assumption of normalityis not essential for conducting this analysis.

Eigenvalues smaller than 1.00 as well as coefficients smaller than .40 were removed (see, for example, Field, 2009). In total, 13 components had eigenvalues greater than 1 and were able to explain 63.27% of the variance within the data. Evaluating the scree plot as a second method of verification, the inflexions were not clear as there was evidence for 12 and 13 facets. However, when inspecting the rotated component matrix, one of the factors did not contain any items with a factor loading above .40. Because of the convergence and this observation, 12 was the final number of factors extracted from the data sets. Furthermore, two items had negative factor loadings, which indicated that those two had to be reversed. Table 25 summarizes all factors, their respective items, and their factor loadings as well as internal consistency measures (i.e., Cronbach's alpha) for both samples separately as well as the whole sample.

Table 25

Rotated Factor Loadings for Exploratory Factor Analysis and Measures of Internal Consistency of Workplace Characteristics

Factor (characteristic of the teaching profession)	Items assigned to each factor	(Rotated) factor loading	Internal consistency (i.e., Cronbach's α)		
			Clinical sample (n = 130)	Non-clinical sample (n = 189)	Total sample (N = 319)
Balance between work and personal Life	I succeed in separating work and private life.	-.83	.78	.84	.83
	I find it difficult to balance work and private life.	.79			
	I find it easy to decide when I am done with my lesson planning.	-.66			
	I never have the feeling to be really 'done' with my work.	.64			
	I find it difficult to estimate when my personal efforts and my engagement suffice.	.58			
Lack of feedback	I miss feedback about long-term effects of my teaching.	.73	.77	.75	.75
	I miss positive feedback from parents.	.73			
	I miss positive feedback from students.	.64			
	It is difficult to observe success in teaching.	.47			
	As a teacher I do not hear about long-term success of my students.	.46			
Lack of career opportunities	My profession does not offer possibilities for promotion.	.78	.73	.77	.76
	I perceive my job as a job without career opportunities.	.78			
	More engagement is not honored through payment.	.65			
	My engagement is not honored adequately.	.50			
Relationship with students	I find it hard to know what students need.	.69	.65	.57	.61
	My influence on the students' behavior is small.	.64			
	My status as an expert for good teaching is doubted by people, who do not work in the context school.	.63			
Lack of task completion	I could always do more.	.78	.63	.78	.72
	I have the feeling that I can always do more.	.73			
Educational and legal regulations	The legal and administrative requirements are counterproductive for my work with the students.	.72	.71	.64	.67
	I find it difficult to balance educational freedom and legal conditions.	.69			

(continued)

Factor (Characteristic of the teaching profession)	Items assigned to each factor	(Rotated) factor loading	Internal consistency (i.e., Cronbach's α)		
			Clinical (n = 130)	Non-clinical (n = 189)	Total (N = 319)
	I find the collaboration with institutions difficult.	.56			
Educational freedom	I find it pleasant to have educational freedom/tolerance.	.83	.69	.59	.65
	I find it pleasant that I can arrange my lessons very openly.	.69			
[1]Exceeding (collaboration) efforts	As a teacher I have to work with numerous different people.	.67	.56	.54	.55
	My profession includes engagement more than the regular extent (e.g., in projects, youth hostels, etc.).	.67			
	In my profession I have to work together with different institutions	.63			
	School is not just a work place for me.	.47			
[1]Collaboration with other people	Collaboration with some people is difficult.	.71	.50	.47	.48
	I cannot choose who I work with.	.71			
[1]Public opinion about the teaching profession	Other people judge about the teaching profession, because they have visited as school themselves.	.82	.45	.31	.38
	All people think they can join in a conversation about the teaching profession.	.79			
	Other people think they can join in a conversation about the teaching profession, because they raise children themselves.	.78			
	As a teacher I play a big part in the performance of my students.	.77			
	Performances of my students are highly dependent on my efforts as a teacher.	.76			
	I perceive my influence on the performance of my students as small.	.60			
[1]Teachers' performance	Failure of my work is reported by students immediately.	.83	.53	.43	.48
	My performance as a teacher is measured based on the performance of my students.	.55			
[1]Time management	Outside of lessons I can plan my working time independently.	.67	.30	.25	.27
	I can decide how much time I invest in work and private life in addition to teaching.	.55			
	I find it almost impossible to do meet the needs of all students.	.45			
	It is a regular prejudice about teachers that they 'work in the morning and are off in the afternoon'.	.40			

Note. [1]Factors reveal critical results for internal consistency.

As can be seen in the table above, the first three factors (i.e., Balance between work and personal life, Lack of feedback and Lack of career opportunities) revealed α-values between .70 and .80, which is sufficient for psychological tests in the scientific literature (e.g., Field, 2009). All remaining factors, however, reached values that are sometimes significantly below the cut-off-value of .70. Therefore, it was checked to see whether removing certain items would lead to new analyses resulting in higher internal consistencies. While for some factors that only consisted of two items (i.e., Lack of task completion, Collaboration with other people, Educational freedom and Teachers' performance), an improvement was not found, the other factors (i.e., Public opinion about the teaching profession, Relationship with students, Exceeding (collaboration) efforts, and Time management) revealed individual changes when items were taken out, but still did not reach the critical value of .70. Only for the factor Educational and legal regulations, the α-value for the non-clinical sample increased to the threshold of .70 when deleting one item, while the internal consistency in the clinical sample was not affected by this deletion.

It is important to keep in mind that lower values can be expected in questionnaires within the social sciences, because the underlying constructs are often very broad and diverse (see Kline, 1999). Additionally, α-values can also be dependent on the number of items included in the analysis, with a lower number of items often resulting in lower values of internal consistency (e.g., Cortina, 1993). Based on these two considerations and the diversity of aspects that are measured with these newly generated items, it was decided to reduce the cut-off-value to $\alpha = .60$. In cases where two out of three measures reached the cut-off-value, but the α-values for the clinical group were slightly below .60 (i.e., factor Relationship with students: $\alpha = .57$; factor Educational and legal regulations: $\alpha = .59$) it was decided to still accept those two groupings as factors. In those cases, it was assumed that this slight deviation is due to the specific characteristics and circumstances of the clinical sample. Despite this new definition of the threshold, five factors revealed very low α-values (i.e., indicated in Table 25). Regarding following analyses including this scale reults have to be interpreted with caution and were partially realized on an individual-ite, level. Furthermore, since an EFA was applied based on both samples taken together, the α-value of the total sample was the most accurate and representative one.

8.1.3. Comparing both samples regarding sensory-processing sensitivity.

Research question 0.3: How do the two samples differ regarding their scores on the scale measuring SPS?

In order to get a preliminary overview of how these two samples differ regarding SPS, Figure 29 below depicts the mean scores on each of the 12 items of the HSP scale for both samples separately.

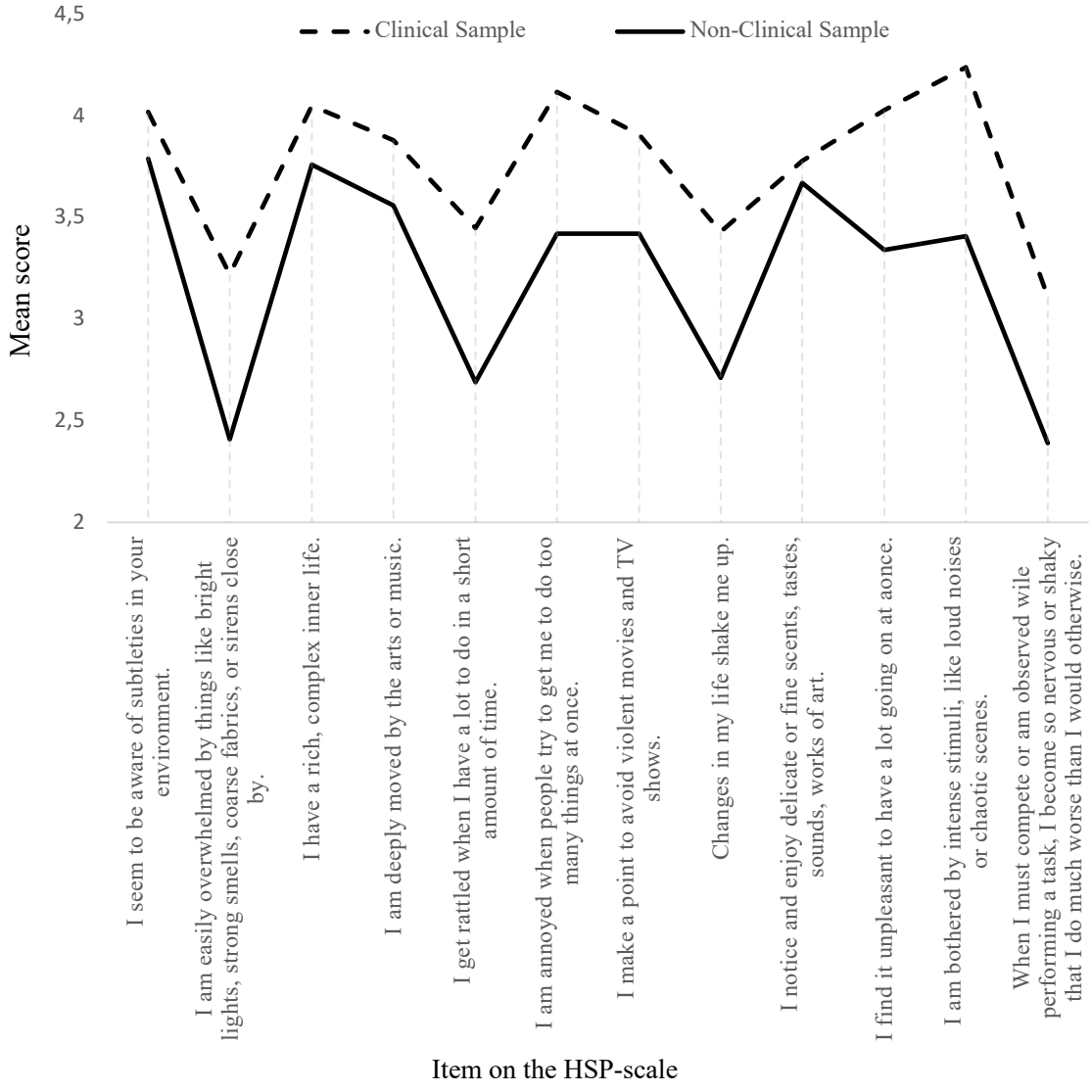

Figure 29. Distribution of scores on the HSP-scale items of both samples separately across individual items.

When looking at Figure 29 above, it is apparent that the clinical sample reached significantly higher scores on average ($M = 3.77$, $SD = 0.55$) than the non-clinical sample ($M = 3.22$, $SD = 0.61$) based on the mean score on the HSP-scale ($t(317) = 8.29$, $p < .001$, $d = 0.94$). Because school type has been found to be a possible confounding variable when comparing these two samples, SPS mean scores were also compared while controlling for this variable (i.e., by applying an ANCOVA), and revealed a smaller effect size ($F(1,315) = 71.40$, $p < .001$, $d = 0.16$). While the ANOVA-effect size on the general mean score was large, the differences on the individual items ranged between small and intermediate, despite its significance across all items (i.e., on a level of at least $p < .05$). The only exception was the item "I notice and enjoy delicate or fine scents, tastes, sounds, work of art". The differences with the biggest effect sizes were found to be on items "I am bothered by intense stimuli, like loud noises and chaotic scenes" ($d = 0.70$) and "Changes in my life shake me up" ($d = 0.67$). In comparison, the smallest effect size was found for the difference on item "I seem to be aware of subtleties in my environment" ($d = 0.23$). Remaining effect sizes ranged between 0.23 and 0.63, representing small to intermediate effect sizes.

Furthermore, the distributions across items differed significantly between the two samples as well, as indicated by a significant result of the Kolmogorov Smirnov test ($p < .001$). More detailed information on descriptive statistics across the two samples can be found in the description of the methodological approach in chapter 7.4..

8.2. Main Analyses and Results

After the preliminary results were obtained, results for the stated research questions and hypotheses (see chapter 6.2.) will be described in the upcoming four chapters. For clarity, they will follow the same order as outlined in the previous chapter.

8.2.1. Part 1: Investigating the validity of sensory-processing sensitivity.

The first aim of this study is to support prior findings that confirm the validity of the construct of SPS and its measurement, the HSP scale. In this context, the construct's validity contains the aspects that have been described above (see chapter 3.3.2.), mainly including construct validity and criterion validity. Analyses were first conducted on the non-clinical sample as the more representative data set. However, all analyses were sconducted and reported based on the

clinical sample. Therefore, assumptions were checked for both samples independently prior to conducting the respective analyses.

8.2.1.1. Sensory-processing sensitivity and its association with measures of psychological well-being.

Research question 1.1: How does SPS relate to measures of psychological well-being (i.e., Depression, Anxiety, and Stress) in each sample?

The first research question aimed at investigating the relationship between measures of psychological well-being and SPS. Pearson and Spearman correlation coefficients were conducted respectively after checking relevant statistical assumptions. First, all variables were measured at least on an ordinal level, so this assumption was fulfilled. Second, it was already shown that the mean scores of Depression and Anxiety did not follow a normal distribution and could not be successfully transformed. Only the mean scores on Stress were normally distributed in the clinical sample and could be transferred to a normal distribution in the non-clinical sample using the log-transformation method. Regarding SPS, the mean scores were normally distributed in the non-clinical sample, but not in the clinical sample. However, the standardized scores for the deviation of the normal distribution in the clinical sample did not exceed the cut-off-value, which indicated that both samples did not significantly deviate from a normal distribution (see Appendix C).

Therefore, the Pearson correlation coefficient was applied for the variable of Stress, while the Spearman correlation coefficient had to be applied to the variables of Depression and Anxiety as they did not meet the assumption of normality. Inspecting the scatter plots for the three relationships stated above, a linear trend was found for all three hypotheses. Therefore, the analysis could be conducted and revealed the following results for each of the four hypotheses.

Hypothesis 1.1A: There is a significant medium positive relationship between SPS and Depression in each sample.

SPS was positively correlated with Depression in the non-clinical sample (r_{sp} = .46; r = .43) and in the clinical sample (r_{sp} = .32; r = .32). All coefficients were significant on a .01 level and revealed medium effect sizes.

The two correlation coefficients did not differ significantly from another (Pearson correlation coefficients: $Z_{difference} = 1.11$; Spearman correlation coefficients: $Z_{difference} = 1.44$).

Hypothesis 1.1B: There is a significant medium positive relationship between SPS and Anxiety in each sample.

Correlation coefficients for the relationship between SPS and anxiety revealed significant results ($ps < .01$) for the clinical ($r_{sp} = .41$; $r = .38$) and non-clinical ($r_{sp} = .39$; $r = .46$) sample. These results indicated a medium-sized effect.

Both correlation coefficients did not differ significantly from each other (Pearson correlation coefficients: $Z_{difference} = 0.84$; Spearman correlation coefficients: $Z_{difference} = 0.21$).

Hypothesis 1.1C: There is a significant medium positive relationship between SPS and Stress in each sample.

SPS was significantly ($ps < .01$) related to Stress in both samples (clinical sample: $r = .36$; non-clinical sample: $r = .50$). When conducting the Pearson correlation analysis on the transferred data set of the non-clinical sample, the coefficient increased slightly to a score of .51. These results indicated a medium-sized effect.

The two correlation coefficients did not differ significantly from one another (Pearson correlation coefficients with original non-clinical data: $Z_{difference} = 1.50$; Pearson correlation coefficients with transformed non-clinical data: $Z_{difference} = 0.12$).

Summary of Research question 1.1

Depression, Anxiety, and Stress were significantly positively correlated with SPS in both samples. The effect sizes were medium in all three analyses. While the correlations with Depression and Stress were slightly higher in the non-clinical sample compared to the clinical sample, the opposite was true for the correlation with Anxiety. Therefore, all three hypotheses were supported.

8.2.1.2. Investigation of variance explained across sensory-processing sensitivity and variables of psychological well-being.

Research question 1.2: How much variance within measures of psychological well-being (i.e., Depression, Anxiety, and Stress) is explained by SPS in each sample?

After the existence and strength of the relationship between SPS and variables of psychological well-being was established above, the second research question aimed at investigating how much variance SPS can explain within the different variables of psychological well-being. As was the case in the first research question, assumptions were checked prior to conducting the analyses.

The assumptions of independence, linearity, variable types and non-zero variance were fulfilled. The remaining assumptions were mainly checked by inspecting the different plots of the respective variables (Bortz, 1999, p. 184). This inspection revealed no concerning deviations and resulted in an elliptical form as suggested by Bortz (1999, p. 184). Furthermore, the Durbin-Watson test revealed results of 2.17 for the clinical and 2.00 for the non-clinical sample, which is within the recommended range. Based on the existing theory on SPS, it could be assumed that the predictor variable was uncorrelated to some external variables, supporting this assumption. Additionally, the assumptions of random errors and homoscedasticity were fulfilled as well as revealed through the inspection of the scatter plots for all three variables and samples separately. Because all assumptions were met, the analysis could be conducted based on the original (and non-transformed) data sets.

Research question 1.2A: How much variance within the measurement of Depression can be explained by SPS in each sample?

SPS significantly predicted mean scores in Depression with a medium effect size ($\beta = .46$, $t(187) = 7.09$, $p < .001$). SPS explained around 21% of the variance ($R^2 = .21$, adjusted $R^2 = .21$; $F(1,187) = 50.29$, $p < .001$; Cohen's $f^2 = 0.27$).

This was also true for the clinical sample, although the effect size and the variance explained (10%) were lower ($\beta = .32$, $t(128) = 3.81$, $p < .001$; $R^2 = .10$, adjusted $R^2 = .10$; $F(1,128) = 14.52$, $p < .001$; Cohen's $f^2 = 0.11$).

Research question 1.2B: How much variance within the measurement of Anxiety can be explained by SPS in each sample?

SPS significantly predicted mean scores in Depression (β = .46, $t(187) = 7.09$, $p < .001$). In particular, it was able to significantly explain 21% of the variance within Anxiety with medium effect size ($R^2 = .21$, adjusted $R^2 = .21$; $F(1,187) = 50.27$, $p < .001$; Cohen's $f^2 = 0.27$).
This was also true for the clinical sample, although the effect size was slightly lower (β = .38, $t(128) = 4.68$, $p < .001$; $R^2 = .15$, adjusted $R^2 = 0.14$; $F(1,128) = 21.87$, $p < .001$; Cohen's $f^2 = 0.18$). The variance explained in this sample was about 15%.

Research question 1.2C: How much variance within the measurement of Stress can be explained by SPS in each sample?

SPS significantly predicted mean scores in Depression (β = .50, $t(187) = 7.97$, $p < .001$). The variance explained by SPS was significant and reached 25%, with a medium to large effect size ($R^2 = .25$, adjusted $R^2 = .25$; $F(1,187) = 63.49$, $p < .001$; Cohen's $f^2 = 0.33$).

A similar result was found for the clinical sample. As was the case in the hypotheses above, the variance explained decreased to roughly 12%, also indicating a slightly lower effect size (β = .36, $t(128) = 4.37$, $p < .001$; $R^2 = .13$, adjusted $R^2 = 0.12$; $F(1,128) = 19.06$, $p < .001$; Cohen's $f^2 = 0.15$).

Summary of Research question 1.2

SPS significantly predicted Depression, Anxiety, and Stress. The effect sizes revealed were medium to almost large (i.e., for Stress) for the non-clinical and medium for the clinical sample. The percentage of variance explained by SPS reached scores of 21% (i.e., for Depression and Anxiety) or 25% (i.e., for Stress) in the non-clinical sample. In the clinical sample, these percentages were lower, accounting for 10% and 14% of the variance in Depression and Anxiety respectively.

Research question 1.3: How much variance within SPS can be explained by measures of psychological well-being (i.e., Depression, Anxiety, Stress) in each sample?

Approaching the further analysis of the relationship between these four variables from another perspective, the present research question investigated how much variance within SPS can be explained by measures of well-being.

In addition to the assumptions met and described in Research question 1.2, the assumption of multicollinearity needed to be assessed since only one predictor was included in the previous model. This assumption was fulfilled. Correlations between the predictor variables did not exceed values of .38 in the clinical sample and .46 in the non-clinical sample, which does not represent perfect (i.e., very strong) linear relationships. Based on these results, the regression model including all three predictors could be conducted.

Conducting the analysis, Depression, Anxiety, and Stress were included into the model simultaneously and explained a significant proportion of the variance within the mean scores in SPS with a large effect size in the non-clinical (R^2 = .29, adjusted R^2 = .27; $F(3,185) = 24.60$, $p < .001$; Cohen's $f^2 = 0.41$) and a medium effect size in the clinical sample (R^2 = .17, adjusted R^2 = .15; $F(3,126) = 8.55$, $p < .001$; Cohen's $f^2 = 0.20$). The percentage for the non-clinical sample reached 27%, and for the clinical sample, 15%.

In the non-clinical sample, Depression revealed no significant influence at all (β = .05, $t(185) = 0.42$, n.s.), while Stress had the most influence on SPS mean scores (β = .33, $t(185) = 3.15$, $p < .01$), followed by Anxiety (β = .21, $t(185) = 2.36$, $p < .05$).

The results in the clinical sample were different. Both variables, namely Depression (β = -.03, $t(126) = -0.18$, n.s.) and Stress (β = .21, $t(126) = 1.53$, n.s.) did not significantly predict SPS mean scores in this model; only aAxiety was a significant predictor (β = .26, $t(126) = 2.36$, $p < .05$).

Summary of Research question 1.3

In the non-clinical sample, all variables of psychological well-being explained 27% of the variance within SPS with a large effect size. In particular, Stress and Anxiety were significant predictors in this model. The variance explained in the clinical sample was lower at 15% and had a medium effect size. Additionally, only Anxiety was found to be significant predictor.

8.2.1.3. Confirmatory support of the differentiation of the three measures of psychological well-being and sensory-processing sensitivity.

Research question 1.4: Can the four measurement scales be supported in the present study using confirmatory factor analysis (in the non-clinical sample)?

Research question 1.4 aimed at analyzing whether the four variables of Depression, Anxiety, Stress, and SPS could be extracted (i.e., as separable factors) from a confirmatory factor model. In the event that the CFA lacked statistical support, an EFA was planned to further investigate the underlying factorial structure of the four variables in both samples separately.

Hypothesis 1.4A: A Confirmatory Factor Analysis reveals statistical support for the fitting of the 4-factor model of the vartiables Depression, Anxiety, Stress, and SPS.

In order to answer Research question 1.4A, a CFA was conducted based on the two samples separately as well as the total sample. Table 26 below summarizes the model fit indices for the three samples.

Table 26

Model Fit Indices for Confirmatory Factor Analysis on Variables of Psychological Well-Being (i.e., Depression, Anxiety, and Stress) and SPS

Sample	General model fit	RMSEA	CFI	NFI
Clinical sample	χ^2 (489) = 967.54	.09	.78	.65
Non-clinical sample	χ^2 (489) = 1038.137	.08	.82	.71
Total sample	*χ^2 (489) = 1358.02*	*.08*	*.86*	*.80*

Note. All *p*s for the general model fit significant on a level of $p < .001$. Italicized scores represent the solution that fit the data of the present study best.

As Table 26 shows, all general model fit indices reached statistical significance, indicating that the data did not fit the hypothesized model. Similarly, the relative fit indices did not reach the respective thresholds for good or even acceptable model fit (see also Hu & Bentler, 1999; Moosbrugger & Schermelleh-Engel, 2008, p. 319). However, despite these findings not supporting the original 4-factor structure, the relative indices reached better scores when applying the model to the total sample as compared to those applied to the individual samples separately.

Research question 1.4B: How many factors can be extracted when including Depression, Anxiety, Stress, and SPS into an exploratory factor analysis (with related factors)?

The assumption of measurement level was fulfilled. Furthermore, because the analysis was supposed to be conducted individually for both samples (as was the case with the variables above), only the non-clinical data set had a sufficient size with a total of 189 participants. Thus, the requirement to have at least five participants per variable was fulfilled (e.g., Field, 2009).

Aross all items in the correlation matrix, no correlations below .30 or above .80 were found. Furthermore, Bartlett's test of sphericity revealed a significant ($p < .001$) result χ^2 (528) = 3379.08. The KMO measures revealed a result of .91, which can be interpreted as good according to Field (2009, p. 647).

It is important to note that prior analyses showed that the variables of Depression, Anxiety and Stress were not normally distributed in the non-clinical sample. Furthermore, while the SPS mean scores were normally distributed in the non-clinical sample and it was possible to transform the data of the variable of Stress to follow a normal distribution, this was not possible for Depression and Anxiety. Therefore, results are not generalizable to the general population and should be interpreted with caution.

In the EFA (with direct oblimin rotation with delta = 0), only eigenvalues greater than 1.00 were retained and coefficients smaller than 0.40 were driooed. In total, seven components had eigenvalues greater than one and were able to explain 64.18% of the variance in the data. Evaluating the scree plot as a second method of verification, the inflexions did not reveal a clear result. While at the point of seven components, an inflexion could be observed, there was one at the number of four components as well. When inspecting the rotated component matrix, it was apparent that some items loaded on more than one factor. These cases were dropped if their factor loadings differed less than 1.00 from each other. If the difference in the score was 1.00 or higher, the item was assigned the factor on which it loaded higher. Based on the agreement of these coefficients and one of the observations based on the scree plot, the final number of factors extracted from the data set was seven. None of the final included items revealed negative factor loadings, which confirmed that the scale did not need any reverse-coded items. All items had factor loadings between 0.41 and 0.81. However, when

investigating the factor structure, only one overarching factor was extracted that included all original sub-scales, which contradicted the existing assumptions.

Based on the results of the aforementioned analysis, an oblique method was applied (i.e., varimax rotation) as well and revealed a more valid solution (i.e., relatively close to the theoretical assumptions). The procedure described above was followed and the variance explained reached a similar value of 63.25% (compared to 64.18% in the previous analysis). Factor loadings were similar as well (i.e., .48 - .73). The final number of factors extracted in the non-clinical sample was seven. Table 27 below lists all resulting factors, the respective items of the factors and their factor loadings.

Of all original items included in the analysis the following number of items remained after conducting the EFA:

- five out of seven items from the original DASS-sub-scale measuring Depression;
- all seven items from the original DASS-sub-scale measuring Anxiety;
- all seven items from the original DASS-sub-scale measuring Stress;
- 11 out of 12 items from the original short version of the HSP-scale measuring SPS.

Table 27

Rotated Factor Loadings for Exploratory Factor Analysis of Variables of Psychological Well-Being (i.e., Depression, Anxiety, and Stress) and SPS in the Non-Clinical Sample

Factor	Item	Original (sub-)scale	Rotated factor loading
Factor 1 Depression	I thought of life as senseless.	DASS-Depression	.81
	I had the feeling that I could not be looking forward to anything anymore.	DASS-Depression	.74
	I felt like I was not worth a lot as a person.	DASS-Depression	.69
	I was incapable of exciting myself about anything.	DASS-Depression	.68
	I felt anxious without a reason.	*DASS-Anxiety*	*.67*
	I found myself close to a panic.	*DASS-Anxiety*	*.73*
Factor 2 Physiological arousal	I felt my heartbeat without being physically active (i.e., feelings of palpitation or extra systole)	DASS-Anxiety	.58
	I had problems breathing.	DASS-Anxiety	.52
	I am easily overwhelmed by things like bright lights, strong smells, coarse fabrics, or sirens close by.	*SPS (LST)*	*.51*

(continued)

Factor	Item	Original (sub-)scale	Rotated factor loading
Factor 3 Anxiety	I was shaking (i.e., my hands).	DASS-Anxiety	.74
	I worried about situations in which I could panic and make myself ridiculous.	DASS-Anxiety	.57
	I noticed that my mouth was dry.	DASS-Anxiety	.50
Factor 4 Stress	*I noticed that I got upset easily.	DASS-Stress	.73
	*I considered myself very sensitive.	DASS-Stress	.72
	*I found it difficult to relax.	DASS-Stress	.72
	*I tended to overreact in situations.	DASS-Stress	.69
	*It was difficult to calm myself down.	DASS-Stress	.66
	*Everything was exhausting to me.	DASS-Stress	.58
	*I reacted angrily to everything that kept me from continuing what I was doing.	DASS-Stress	.46
	It difficult for me to get up and take care of things.	*DASS-Depression*	*.61*
Factor 5 SPS-Sensitivity to arts	I notice and enjoy delicate or fine scents, tastes, sounds, works of art.	SPS (AES)	.79
	I make a point to avoid violent movies and TV shows.	SPS (LST)	.57
	I am deeply moved by the arts or music.	SPS (AES)	.53
Factor 6 SPS-Aesthetic sensitivity	I have a rich, complex inner life.	SPS (AES)	.75
	I am aware of subtleties in my environment.	SPS (AES)	.71
Factor 7 SPS-Ease of excitation	I get rattled when I have a lot to do in a short amount of time.	SPS (EOE)	.79
	I am annoyed when people try to get me to do too many things at once.	SPS (EOE)	.77
	I find it unpleasant to have a lot going on at once.	SPS (EOE)	.76
	Changes in life shake me up.	SPS (EOE)	.54
	When I compete or am observed while performing a task, I become so nervous and shaky that I do much worse than I would otherwise.	SPS (EOE)	.48

Note. Italicized items represent those that were originally assigned to a different factor.
*variables have been transformed into a normal distribution using the log-method.

As shown in Table 27 above, the analysis revealed results that despite some overlap among items, there are relatively clear factors that distinguish the variables of SPS, Depression, Anxiety, and Stress from one another. The following factors resulted from the analysis:

- Factor 1 represented four items from the DASS-scale measuring Depression, but also included two items from the DASS sub-scale, which measureds Anxiety. Out of the seven original items on Depression, four items were in this factor and one in Factor 4. Based on

the number of items from the original scale measuring Depression, this factor can be called Depression.

- Factor 2 included two items from the DASS-scale measuring Anxiety and one additional item measuring SPS. The content included in this factor seems to be physical or physiological arousal, because items on aspects like breathing problems, feeling one's own heartbeat and reacting to strong smells, sirens or bright lights were found in this factor. Although the last aspect originally aimed at measuring the facet of Low sensory threshold (see for example Smolewska et al., 2006) of the trait of SPS, participants seemed to have understood this item as being similar to the other aspects of physiological arousal, originally measured as part of Anxiety. Therefore, this factor could be called Physiological arousal.
- Factor 3 also included items from the original DASS scale measuring Anxiety without any additional items included. This factor can therefore be called Anxiety.
- Factor 4 contained all items that are found in the DASS sub-scale that measures Stress, but also included one item on Depression from the same measurement (DASS-21). This factor can therefore be called Stress.
- Factors 5, 6, and 7 all included items of the HSP-scale measuring SPS. In all three factors, no items from other DASS-scales were included and therefore they solely consisted of SPS items. All of these factors can be called SPS (the distinction between those three factors will be described in more detail below as part of Research question 1.4C).

Research question 1.4C: Can the different facets (i.e., factors) of SPS already be represented in the results of the Exploratory Factor Analysis?

All itmes of the HSP scale were found to be distributed into three factors (i.e., Factors 5, 6, and 7), which indicated a preliminary agreement with a 3-factor structure. While Factor 3 contained items that all have been assumed to relate to Ease of excitation (EOE), Factor 7 solely contained items measuring Aesthetic sensitivity (AES). Both factors could therefore be called SPS-Ease of excitation and SPS-Aesthetic sensitivity respectively. Furthermore, Factor 6 contained two items from the facet AES and one item from Low sensory threshold (LST). All three items included aspects of enjoying the arts, which might be the focus of this factor. In the present study, this factor could therefore be named SPS-Sensitivity to arts.

Research question 1.4D: Based on the clinical sample, can the exploratory factor analysis also reveal four independent factors that represent the four different constructs (i.e., SPS, Depression, Anxiety, and Stress)?

For the sake of completeness, the results of the EFA based on the clinical sample will also be described shortly after describing the assumptions. Due to similar methodological issues regarding the number of factors onto which the items loaded, the oblique solution (i.e., Varimax rotation) was also applied for the analysis based on the clinical data. Although the variables of Stress and SPS did not deviate significantly from a normal distribution, it is important to consider that Anxiety and Depression were not normally distributed. Furthermore, Bartlett's test of Sphericity revealed a significant result χ^2 (528) = 2416.47. However, the KMO measures revealed a result of .88, which exceeds the threshold of .80, indicating an adequate sampling. In addition, it is important to consider the small sample size of n = 130, which does not fit the requirements of having at least five participants per variable in the analysis. Therefore, the results should be interpreted carefully.

The same settings and decisions as were used for the EFA on the non-clinical data were also used in this analysis based on the clinical data set. Furthermore, factors with only one item were disregarded and removed from the results. Based on the inspection of the scree plot and the statistical results, a solution with seven factors was applied in this research question. Those seven factors were able to explain 66.38% of the variance within the data.

Table 28 below summarizes the results of the rotated (using Varimax-Rotation) factor solution based on the clinical sample.

Of all original items, the following number of items remained after conducting the exploratory factor analysis:

- six out of seven items from the original DASS-sub-scale measuring Depression;
- three out of seven items from the original DASS-sub-scale measuring Anxiety;
- five out of seven items from the original DASS-sub-scale measuring Stress;
- 11 out of 12 items from the original short version of the HSP-scale measuring SPS.

Table 28

Rotated Factor Loadings for Exploratory Factor Analysis of Variables of Psychological Well-Being (i.e., Depression, Anxiety, and Stress) and SPS in the Clinical Sample

Factor	Item	Original scale	Rotated factor loading
Factor 1: Depression and Stress	I had the feeling that I could not be looking forward to anything anymore.	DASS-Depression	.87
	I felt depressed and sad.	DASS-Depression	.84
	I was incapable of exciting myself for anything.	DASS-Depression	.81
	I could not experience any positive emotions any more at all.	DASS-Depression	.79
	It was difficult for me to get up and take care of things.	DASS-Depression	.71
	I found it difficult to relax.	*DASS-Stress*	*.67*
	It was difficult to calm myself down.	*DASS-Stress*	*.56*
	Everything was exhausting to me	*DASS-Stress*	*.73*
Factor 2: Anxiety	I felt my heartbeat without being physically active (i.e., feelings of palpitation or extra systole).	DASS-Anxiety	.73
	I felt anxious without a reason.	DASS-Anxiety	.69
	I found myself close to a panic.	DASS-Anxiety	.66
	I worried about situations in which I could panic and make myself ridiculous.	*DASS-Depression*	*.59*
Factor :3 Stress	I reacted angrily to everything that kept me from continuing what I was doing.	DASS-Stress	.71
	I tended to overreact in situations.	DASS-Stress	.70
Factor 4: SPS (EOE) - Multitasking	I get rattled when I have a lot to do in a short amount of time.	SPS (EOE)	.81
	I am annoyed when people try to get me to do too many things at once.	SPS (EOE)	.79
	I find it unpleasant to have a lot going on at once.	SPS (EOE)	.78
Factor 5: SPS (AES)	I am aware of subtleties in my environment.	SPS (AES)	.76
	I notice and enjoy delicate or fine scents, tastes, sounds, works of art.	SPS (AES)	.72
	I have a rich, complex inner life.	SPS (AES)	.70
	I am deeply moved by the arts or music.	SPS (AES)	.69
Factor 6: SPS (EOE)	Changes in my life shake me up.	SPS (EOE)	.76
	When I compete or am observed while performing a task, I become so nervous and shaky that I do much worse than I would otherwise.	SPS (EOE)	.65
Factor 7: SPS (LST)	I make a point to avoid violent movies and TV shows,	SPS (LST)	.81
	I am bothered by intense stimuli, like loud noises or chaotic scenes.	SPS (LST)	.53

Note. Italicized items represent those that were originally assigned to a different factor.
*variables have been transformed into a normal distribution using the log-method.

The resulting factors can be described and named as such:

- Factor 1 represented the only factor consisting of a mix between five items from the original DASS sub-scale measuring Depression and three items from the original sub-scale measuring Stress. Because one of the remaining factors only included items from the DASS that measured Stress, this factor was called Depression.
- The second factor consisted of three items measuring Anxiety and one item measuring depression. Since the majority of items loading on this factor measured Anxiety and the item from the original DASS-scale measuring Depression had the lowest factor loading, this factor was called Anxiety.
- The third factor was called Stress, because it included two items that were from the original DASS sub-scale, which measured Stress;
- Factor 4 included three of the items measuring SPS from the EOE factor, which was the reason for this factor being named SPS-EOE-Multitasking. In particular, the items loading on this factor measured situations of having more than one thing to do at once.
- Factor 5 included all four items that have been assigned to the AES factor in prior studies. Therefore, it was called SPS-AES.
- The sixth factor contained the remaining two items that have been assigned to the SPS-facet EOE in previous studies. Compared to Factor 3, which also included EOE items, the items in this factor seemed to focus more on performance-related situations and life changes, which did not necessarily include multitasking (i.e., which was the focus of Factor 3). This factor was therefore called SPS-EOE.
- Factor 7 included two of the three items that original have been previously related to LST. Thus, this factor was named SPS-LST.

Summary of Research question 1.4

By conducting an EFA based on the three variables of psychological well-being and SPS in both samples, seven factors were extracted. Those factors were able to explain 63.25% and 66.38% in the non-clinical and the clinical sample respectively. The mixture between items from the three DASS sub-scales and the HSP scales could only be observed in one case and is therefore not a problematic issue. Additionally, in both samples, items measuring SPS did not make up one, but three factors. In the non-clinical sample, different mixtures between the items of the three DASS sub-scales (i.e., Depression, Anxiety, and Stress) were found as well as two factors that contained items measuring Anxiety, one of which focused on physiological arousal.

Only one item measuring SPS was mixed with items from the DASS sub-scales, and it was assigned to the factor measuring physiological arousal. While a similar mixture of items from the three DASS sub-scales was found also in the clinical sample, no item measuring SPS was mixed with any of the three sub-scales Depression, Anxiety and Stress. Rather, items from the original HSP sub-scale EOE were divided and found in two different factors with one of them focusing specifically on multitasking.

8.2.1.4. Confirming the factorial structure within the construct of sensory-processing sensitivity.

Research question 1.5: Can the recently established bifactorial structure of SPS be confirmed in the present data set based on the shortened HSP scale?

In recent publications with different samples, a bifactorial solution was investigated and statistically supported. Research question 1.5 aimed at replicating these findings using a German scale on a German sample which has not been done before.

Hypothesis 1.5A: The bifactor solution fits the data in the present data set better than the solution with three factors or one factor.

The answer to this research question was explored by conducting a CFA on both samples independently as well as on the total sample. Figure 30 below summarizes all three models in one total model. Specifically, the based model depicted is the bifactorial model as suggested in recent research papers. The part of the total model that would represent the one-factor and the three-factor model are indicated by dashed lines. The one-factor model just includes one general factor onto which all items load (depicted in the left half of Figure 30 below), while the three-factor model included the three established factors and the respective items which load onto them (depicted in the right half of Figure 30). Based on prior research (see Pluess et al., 2018), the three factors are allowed to be correlated with one another (depicted through the dashed two-sided arrows in Figure 30 below), though this was not possible in the total, bifactor model (i.e., in zhe total model depicted in Figure 30, the three factors are set to be constrained, which does not allow them to correlate with each other).

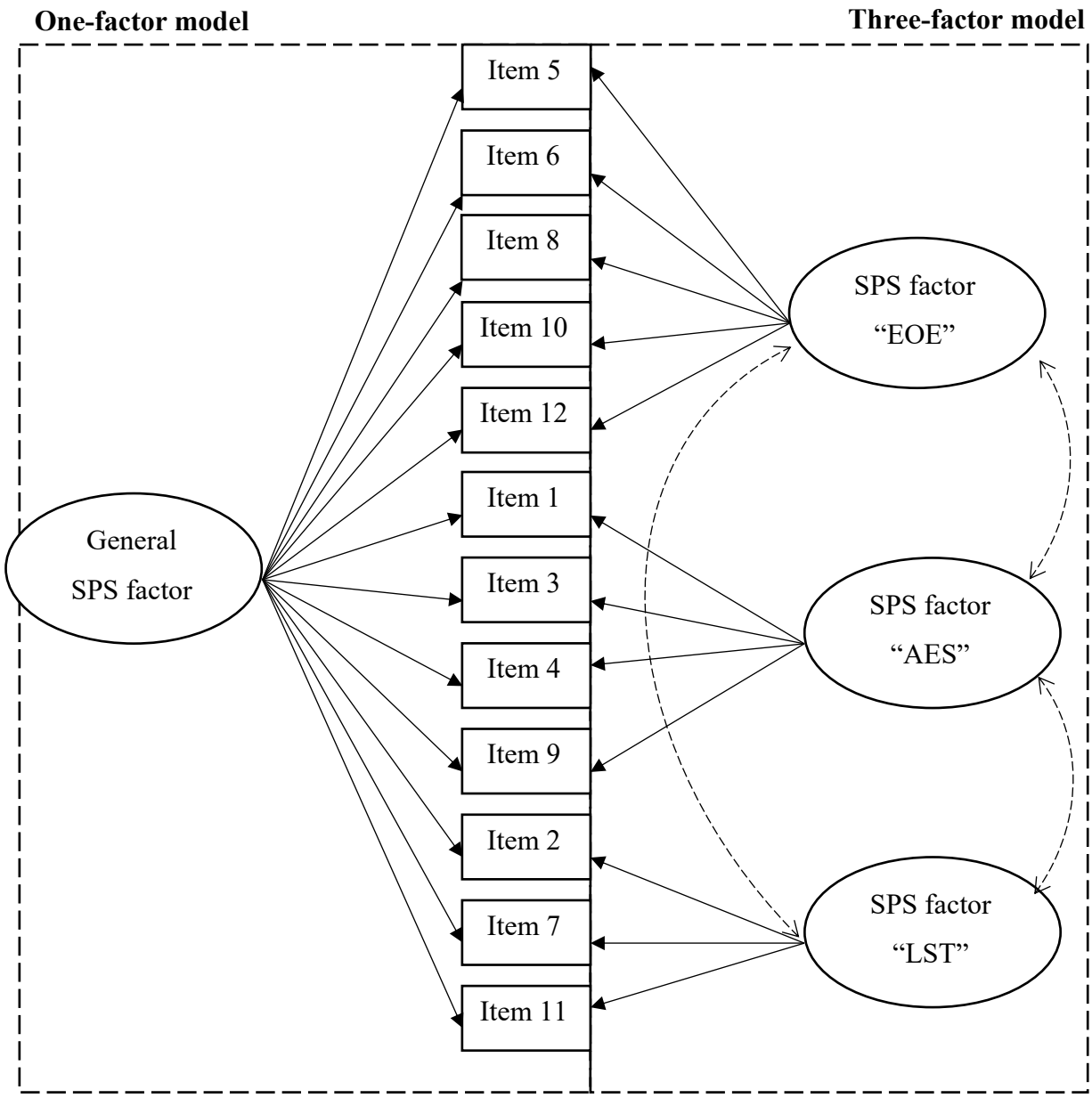

Figure 30. Model of all factorial structures of the HSP scale analyzed.
EOE=Ease of excitation; AES=Aesthetical sensitivity; LST=Low sensory threshold.

In order to evaluate the model fit, the following fit indices were applied: χ^2, *RMSEA*, *CFI* and *NFI*. In addition, the internal consistency was also calculated for all individual factors. Table 29 summarizes all findings in all three samples.

Table 29

Model Fit Indices for Confirmatory Factor Analyses (i.e., One-Factor, Three-Factor and Bifactor) of SPS

Model	General model fit (χ^2)	RMSEA	CFI	NFI
Non-clinical sample (n = 189)				
One-factor model	χ^2 (54) = 224.15	.13	.71	.65
Three-factor model	χ^2 (51) = 116.92	*.08*	.89	.82
Bifactorial model	χ^2 (42) = 104.35	.09	.89	.84
Clinical sample (n = 130)				
One-factor model	χ^2 (54) = 227.91	.16	.53	.49
Three-factor model	χ^2 (51) = 115.41	.10	.83	.74
Bifactorial model	χ^2 (42) = 95.66	.10	.86	.79
Total sample (N = 319)				
One-factor model	χ^2 (54) = 378.89	.14	.71	.68
Three-factor model	χ^2 (51) = 155.74	*.08*	.91	.87
Bifactorial model	χ^2 (42) = 127.48	*.08*	.92	.89

Note. Italicized coefficients represent those with the best result. All *p*s significant on a level of $p < .001$. In the model with three factors, the factors are allowed to correlate, while in the bifactor solution, the three factors and the total factor were not allowed to correlate (i.e., they were constrained to be orthogonal).

After applying the cut-off-values of the fit indices described above (see chapter 7.6.1.2.), only the three-factorial model reached acceptable model fit indices in the non-clinical and the total sample. This was also true for the bifactorial model in the total sample. The remaining fit indices did not reach scores that could be interpreted as good or acceptable. The chi-square index, which indicates the general model fit, was significant, indicating that the data did not fit the specified models. Therefore, none of the three suggested models fit the data of the present study properly (i.e., as indicated by more than one relative fit index score or the general model fit).

Summary of Research question 1.5

In the present study, none of the three possible factorial structures of the SPS construct suggested in recent studies could be supported in either of the two data sets separately or in the total sample.

8.2.1.5. Extracting different sensitivity groups.

Research question 1.6: Can three independent groups of people that differ with regard to their level of SPS be replicated in the present study

The sixth research question sought to replicate findings by Pluess and colleagues (2018), which revealed three distinct sensitivity groups wthin the general population. Specifically, these groups should be similar regarding their mean scores on SPS within the groups and differ between those groups.

Hypothesis 1.6A: The results suggest a three-group solution based on the shortened HSP scale to fit the present data (based on both samples individually) better than the solution with one, two, or four groups.

To investigate which of the three hypothesized models fit the data the best, LCAs were applied using Mplus (Muthén & Muthén, 1998-2012). All indices described in the methods section are applied in these analyses (see chapter 7.6.2.1.). Additionally, in order to evaluate the reliability of the models, all entropy scores reach values around .90, which is interpreted as good (Geiser, 2011, p. 249). Although it is not specifically reported in the table above, the probabilities for most likely latent class memberships in the matrix of the standard output were found to be close to one for all data sets and models, indicating high reliability of classification (p. 250).

Table 30 below summarizes the results for the two tested models (i.e., two classes and three classes) for the clinical and the non-clinical samples individually.

Table 30

Model Fit Indices for Latent Class Analysis with One, Two, Three and Four Classes of SPS Mean Scores

No. of classes	AIC	BIC	*n-a*BIC	LMR-A (*p*)	Entropy
Non-clinical sample (*n* = 189)					
1 Class	6598.33	6753.94	6601.896	-	-
2 Classes	6359.92	*6674.37*	6367.12	*336.41 (p < .01)*	.85
3 Classes	6280.15	6753.44	6290.98	177.78 (n.s.)	.89
4 Classes	*6245.55*	6877.69	6260.03	132.54 (n.s.)	.92
Clinical sample (*n* = 130)					
1 Class	4350.29	4485.06	4336.41	-	-
2 Classes	4194.87	*4467.28*	4166.82	*251.42 (<.01)*	.90
3 Classes	*4162.23*	4572.29	4120.01	128.64 (n.s.)	.94
4 Classes	4168.93	4716.62	4112.53	89.30 (n.s.)	.96
Total sample (*N* = 319)					
1 Class	11182.47	11363.20	11210.96	-	-
2 Classes	10607.76	**1***0972.98*	10665.32	*672.71 (<.001)*	.86
3 Classes	10473.51	11023.23	10560.15	232.25 (n.s.)	.86
4 Classes	*10382.97*	11117.18	10498.68	188.54 (n.s.)	.87

Note. Italicized results represent the indices that fit the respective data the best.
AIC = Akaike's Information Criterion; BIC = Bayesian Information Criterion; LMR = Lo-Mendell-Rubin adjusted likelihood ratio test, and entropy.

According to Nylund, Asparouhov, and Muthén (2007) “there is not common acceptance of the best criteria for determining the number of classes in mixture modeling, despite various suggestions” (p. 537). On the one hand, adjusted BIC has been suggested as the best indicator on which to base decisions about the appropriate number of classes (Tofighi & Enders, 2007). On the other hand, however, it has been suggested that the (non-adjusted) BIC is a good indicator (Geiser, 2011, p. 270). In the study by Lionetti and colleagues (2018), which the present study aimed at replicating, the main focus was on the AIC and the (non-adjusted) BIC values. Table 30 shows that the smallest BIC values in all samples were found in the two-class-solution. The LMR-A values were also significant for the solution with two classes in all three samples. Although the solution with the lowest scores on AIC differed significantly across

samples, the biggest drop in all three samples was found when converting from the one-class to the two-class solution. Therefore, prevuizs findings could not be replicated and the best fitting model for the present data sets was the two-class model.

8.2.1.6. Investigating cut-off scores for the revealed sensitivity groups.

Research question 1.6B: What are the cut-off-scores of the resulting model?

In order to determine the cut-off-scores with which the two classes could be differentiated, density plots were analyzed. Based on previous studies on this procedure, the cut-off was set to the point at which the two density graphs cross. Since the non-clinical sample represented the briader population more accurately, the cut-off scores found based on this sample were used in both samples (i.e., were transferred to the clinical sample). Figure 31 displays the density plots of the two classes in the non-clinical sample.

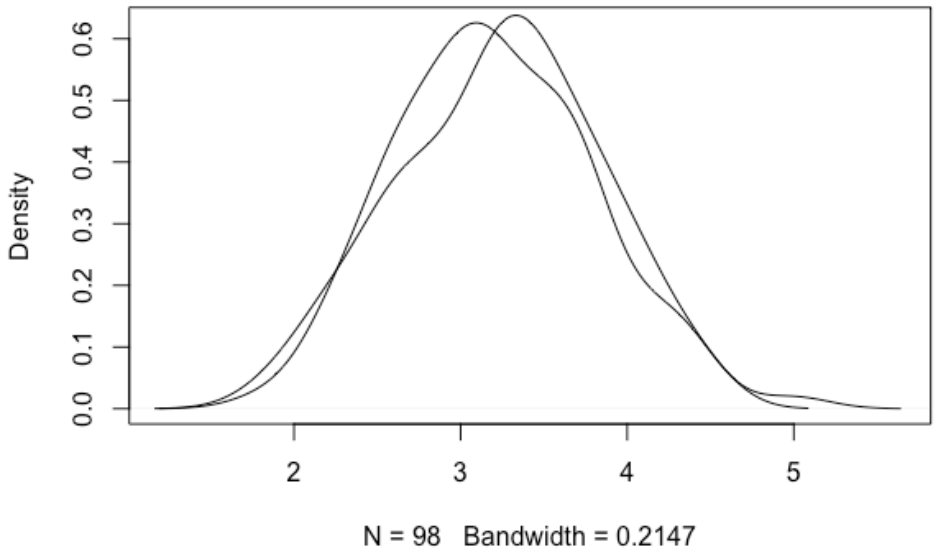

Figure 31. Density plot of the two resulting classes in the non-clinical sample.

Figure 31 above shows that the two distributions were very similar in shape and had a significant overlap. Thus, no classes could be created based on the present data set. Therefore, in further analysis, the variable could be applied in its continuous original form.

Depending on the specific research question and hypothesis, an alternative approach for conducting analyses based on different classes could be used by creating groups using the top and bottom 30% of the sample, as suggested by Pluess et al (2018, p. 65). Based on these three

groups, the cut-off can be inferred. Because so little research has outlined cut-off scores so far, this approach seemed appropriate in the present study. The following research question therefore aimed at investigating this theoretical approach with the present non-clinical data.

Research question 1.6C: Which cut-off-scores can be revealed when considering the suggested 30/40/30 approach to create three different sensitivity groups?

To determine the cut-off-scores that resulted in dividing the sample into three groups (i.e., the top and bottom 30% and the 40% between those extreme groups; see Pluess et al., 2018), the distribution of mean scores in the non-clinical sample was inspected. In doing this, 28% of participants reached scores equal to or below 2.83, 45% of participants reported scores between 2.84 and 3.58, while the remaining 27% were assigned to the group with the highest scores. The resulting cut-off scores lead to the following description of groups:

- Group 1 (low sensitive group): $M_{SPS} \leq 2.83$;
- Group 2 (medium sensitive group): $2.83 < M_{SPS} \leq 3.58$;
- Group 3 (high sensitive group): $M_{SPS} > 3.58$.

Research question 1.6D: Do the resulting three sensitivity groups differ significantly regarding their overall HSP mean scores?

Since the classes have been deducted based on the mean of the participants' scores on all 12 items, it was assumed that the three groups differed significantly on their mean SPS scores. This would further support the validity of this theoretically-based approach. In order to analyze the data and check the hypothesis, two different kinds of statistical tests were applied (i.e., one-way ANOVA or the Kruskal-Wallis H test). The decision about which test was used was based on whether the statistical assumptions were met. Table 31 below shows that neither assumption was met for any of the three groups. Therefore, the Kruskal-Wallis H test was applied for all three samples. As was the case before, the one-way ANOVA has been applied as well for the sake of completeness and due to ongoing discussions in the field of statistics (e.g., Elliott & Woddward, 2007; Norman, 2010; Pallant, 2007).

Table 31

Summary of Mean Scores, Standard Deviations, Paramters of Normality, Homogeneity of Variance, and Statistical Difference on Mean SPS Scores Across Sensitivity Groups

Class	Mean Standrard deviation	Test of normality	z-scores skewness and kurtosis	Levene's test	Statistical analysis and effect size
Class 1	*M* = 2.47 *SD* = 0.29	*D*(53) = .18***	$z_{skewness}$ = *3.61* $z_{kurtosis}$ = *2.19*	*F*(2,186) = 5.10**	*H*(2) = 163.40*** Mean Ranks: 1 = 27.00 2 = 96.00 3 = 164.00 *d* = 5.12
Class 2	*M* = 3.24 *SD* = 0.20	*D*(85) = .11*	$z_{skewness}$ = 0.28 $z_{kurtosis}$ = *1.99*		
Class 3	*M* = 3.96 *SD* = 0.29	*D*(51) = .21***	$z_{skewness}$ = *3.58* $z_{kurtosis}$ = *2.46*		*F*(2,186) = 444.81*** *d* = 4.37

Note. Italicized z-scores are above the threshold and represent a significant deviation from a normal distribution.
*p < .05; **p < .01; ***p < .001.

Results revealed that the mean scores on the HSP scale differed significantly between the three groups. The difference followed a tendency which would be expected from theory and prior studies, with the low sensitive group (i.e., Class 1) showing the lowest mean score and the high sensitive group (i.e., Class 3) reporting the highest mean score. This was further supported by significant (at least on a level of p_a < .001) post-hoc tests (i.e., Dunn-Bonferroni-test).

Research question 1.6E: Do the resulting three sensitivity groups differ significantly regarding their scores on all 12 items of the shortened HSP scale?

A second step analyzed whether these groups also differed on their scores on all 12 items of the HSP scale to gain a more detailed understanding of the differences between the three sensitivity groups. Table 32 summarizes the results of the Kruskal-Wallis H test and the ANOVA for the differences on all 12 items. The distributions were not normal for all items, making the application of the non-parametric statistical test necessary.

Table 32

Summary of Mean, Standard Deviations, Mean Ranks and Statistical Difference Between Sensitivity Groups on the Individual HSP-Scale Items

Item	Mean rank (M_R), Mean (M) and Standard deviation (SD)			Kruskal-Wallis H test and ANOVA (and effect size)
	Low sensitive group (n = 53)	Medium sensitive group (n = 85)	High sensitive group (n = 51)	
Item 1	M_R = 71.31 M = 3.36 SD = 0.88	M_R = 94.80 M = 3.81 SD = 0.84	M_R = 119.95 M = 4.22 SD = 0.97	$H(2) = 12.79$**, $d = 0.50$ $F(2,186) = 12.21$, $d = 0.72$
Item 2	M_R = 56.34 M = 1.47 SD = 0.64	M_R = 88.42 M = 2.19 SD = 1.09	M_R = 146.14 M = 3.75 SD = 1.09	$H(2) = 17.57$***, $d = 0.61$ $F(2,186) = 73.28$, $d = 1.78$
Item 3	M_R = 67.54 M = 3.30 SD = 0.85	M_R = 96.22 M = 3.78 SD = 0.88	M_R = 121.50 M = 4.22 SD = 0.70	$H(2) = 16.64$***, $d = 0.59$ $F(2,186) = 15.97$, $d = 0.83$
Item 4	M_R = 65.07 M = 2.94 SD = 0.97	M_R = 104.09 M = 3.75 SD = 0.95	M_R = 110.96 M = 3.86 SD = 1.10	$H(2) = 24.44$***, $d = 0.74$ $F(2,186) = 14.09$, $d = 0.80$
Item 5	M_R = 55.04 M = 1.78 SD = 0.79	M_R = 97.01 M = 2.67 SD = 0.84	M_R = 133.18 M = 3.59 SD = 1.19	$H(2) = 43.64$***, $d = 1.07$ $F(2,186) = 44.42$, $d = 1.38$
Item 6	M_R = 55.51 M = 2.55 SD = 1.01	M_R = 95.22 M = 3.46 SD = 0.93	M_R = 135.68 M = 4.27 SD = 0.96	$H(2) = 35.91$***, $d = 0.94$ $F(2,186) = 41.94$, $d = 1.34$
Item 7	M_R = 57.82 M = 2.42 SD = 1.32	M_R = 103.21 M = 3.66 SD = 1.28	M_R = 119.95 M = 4.08 SD = 1.11	$H(2) = 16.33$***, $d = 0.58$ $F(2,186) = 28.83$***, $d = 0.11$
Item 8	M_R = 57.54 M = 1.98 SD = 0.77	M_R = 94.33 M = 2.67 SD = 0.82	M_R = 135.05 M = 3.53 SD = 0.97	$H(2) = 52.56$***, $d = 1.22$ $F(2,186) = 43.25$***28/45/, $d = 1.36$
Item 9	M_R = 66.11 M = 3.09 SD = 1.02	M_R = 100.84 M = 3.80 SD = 0.95	M_R = 115.29 M = 4.06 SD = 0.97	$H(2) = 18.38$***, $d = 0.62$ $F(2,186) = 14.04$, $d = 0.78$
Item 10	M_R = 50.88 M = 2.49 SD = 0.78	M_R = 94.18 M = 3.33 SD = 0.78	M_R = 142.22 M = 4.25 SD = 0.80	$H(2) = 23.68$***, $d = 0.73$ $F(2,186) = 66.20$, $d = 1.69$
Item 11	M_R = 50.64 M = 2.36 SD = 1.04	M_R = 94.24 M = 3.44 SD = 1.06	M_R = 142.37 M = 4.47 SD = 0.64	$H(2) = 25.59$***, $d = 0.76$ $F(2,186) = 62.81$, $d = 1.64$
Item 12	M_R = 65.08 M = 1.81 SD = 1.11	M_R = 94.32 M = 2.27 SD = 0.91	M_R = 127.24 M = 3.18 SD = 1.31	$H(2) = 36.33$***, $d = 0.95$ $F(2,186) = 21.52$, $d = 0.96$

Note. All results of the one-way ANOVA reached significance on a level of $p < .001$. M_R = mean rank; M = mean, SD = standard deviation.

As can be seen, all three groups differed significantly from each other on all 12 HSP items. Post hoc tests (i.e., Dunn-Bonferroni-test) revealed that the low and the medium sensitive

groups did not significantly differ from each other on all but one item (i.e., item 7: “I make a point to avoid violent movies and TV shows”). Furthermore, the two most extreme groups, the low and the high sensitive group, did not differ significantly on mean SPS scores on items 1 (“I seem to be aware of subtleties in my environment”) and 2 (“I am easily overwhelmed by things like bright lights, strong smells, coarse fabrics, or sirens close by”). Similarly, the medium and the high sensitive group did not differ significantly on item 7 either. On the remaining items, the three groups differed significantly from each other on a significance level of at least $p < .05$. The effects regarding the differences were found on items 8 (i.e., $d = 1.22$) and 5 (i.e., $d = 1.07$). In addition to the statistical results, Figure 32 depicts the distribution of the three groups on all 12 items on the shortened HSP scale.

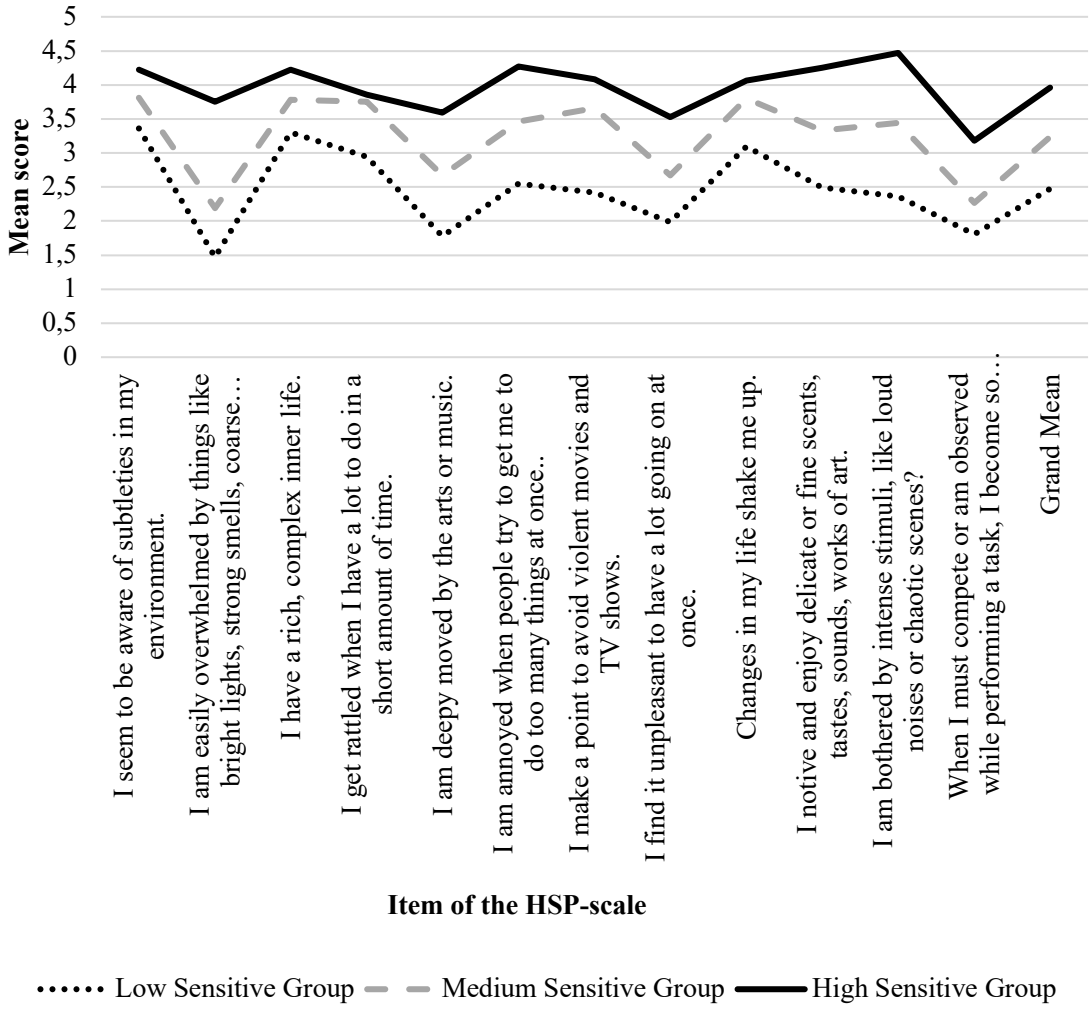

Figure 32. Distribution of the three resulting sensitivity groups across all items on the HSP scale.

8.2.1.7. Transferring the cut-off scores to the clinical sample.

Research question 1.6F: When applying these cut-off-scores to the clinical sample, what does the resulting distribution look like?

When taking the cut-off-scores revealed based on the non-clinical sample and applying them to the clinical sample, the following group sizes resulted:

- Class 1 (low sensitive group): $n = 7$ (5.40%);
- Class 2 (medium sensitive group): $n = 47$ (36.20%);
- Class 3 (high sensitive group): $n = 76$ (58.50%).

Research question 1.6G: Do the three sensitivity groups in the clinical sample differ regarding their overall HSP mean scores?

To answer this research question, the same procedure used with the non-clinical sample was applied with the clinical sample. In line with the previous procedure, Table 33 below depicts the results of the preliminary analyses regarding the assumption for an ANOVA as well as the result of the respective statistical test. In both cases the results of the ANOVA were calculated and reported.

Table 33

Summary of Mean Scores, Standard Deviations, Parameters of Normality, Homogeneity of Variance, and Statistical Difference on Mean SPS Scores Across Sensitivity Groups

Class	Mean and standard deviation	Test of normality	z-scores skewness and kurtosis	Levene's test	Statistical analysis and effect size
Class 1	$M = 2.69$ $SD = 0.12$	$D(7) =$ 0.16, n.s.	$z_{skewness} = 1.26$ $z_{kurtosis} = 0.61$	$F(2,127) =$ 11.72***	H(2) = 97.35*** Mean Ranks: 1 = 4.00 2 = 31.00 3 = 92.50 $d = 3.47$ $F(2,186) =$ 167.79*** $d = 3.25$
Class 2	$M = 3.32$ $SD = 0.21$	$D(47) =$ 0.17**	$z_{skewness} = 1.65$ $z_{kurtosis} = 1.26$		
Class 3	$M = 4.15$ $SD = 0.34$	$D(76) =$ 0.13**	$z_{skewness} = 0.35$ $z_{kurtosis} = 1.87$		

Note. $^{**}p < .01$; $^{***} = p < .001$.

Table 33 shows that the three classes differed regarding their general mean scores on the HSP scale in the clinical sample as well. This was further supported by significant (ps < .001) post-

hoc tests (i.e., Dunn-Bonferroni-test) for differences between the low and the high sensitive groups as well as the Medium and the high sensitive groups. For differences between the Low and the medium sensitive groups, the difference was not stiatistically significant. This was supported by Gabriel's post-hoc tests for all possible comparisons
($ps < .001$).

Research question 1.6H: Do the resulting three sensitivity groups differ significantly regarding their scores on all 12 items of the shortened HSP scale when analyzing the clinical sample?

Following the procedure above, Table 34 below depicts the results of the Kruskal-Wallis H test and the mean ranks for all three groups in the clinical sample. As was the case above as well, the results of a one-way ANOVA are also reported. As can be seen, all three groups differed significantly from each other on all 12 HSP items. Post hoc tests (i.e., in most cases the Dunn-Bonferroni-test) revealed that the low and the medium sensitive groups did not differ significantly on any of the 12 items. Furthermore, the difference between the low and the high sensitive groups did not reveal statistical significance on items 1 and 2 either. However, the remaining differences were significant on a level of at least $p < .01$. The differences with the highest effect sizes were found to be on items 5 (i.e., $d = 1.40$) and 12 (i.e., $d = 1.22$). Figure 33 below also includes the graphical depiction of the differences between the three groups on all 12 items of the HSP scale in the clinical sample.

Table 34

Summary of Mean Ranks, Mean Scores, Standard Deviations and Statistical Differences between Sensitivity Groups on HSP-Scale Items

Item	Mean rank (M_R), Mean (M) and Standard deviation (SD)			Kruskal-Wallis H test (and effect size)
	Low sensitive group ($n = 7$)	Medium sensitive group ($n = 47$)	High sensitive group ($n = 76$)	
Item 1	$M_R = 58.36$ $M = 4.00$ $SD = 0.58$	$M_R = 51.50$ $M = 3.60$ $SD = 1.16$	$M_R = 74.82$ $M = 4.29$ $SD = 0.89$	$H(2) = 12.79$**, $d = 0.61$ $F(2,127) = 7.22$**, $d = 0.67$
Item 2	$M_R = 49.86$ $M = 2.71$ $SD = 1.11$	$M_R = 49.53$ $M = 2.68$ $SD = 1.22$	$M_R = 76.82$ $M = 3.59$ $SD = 1.02$	$H(2) = 17.57$, $d = 0.75$ $F(2,127) = 10.71$, $d = 0.82$

(continued)

Item	Mean rank (M_R), Mean (M) and Standard deviation (SD)			Kruskal-Wallis H test (and effect size)
	Low sensitive group (n = 7)	Medium sensitive group (n = 47)	High sensitive group (n = 76)	
Item 3	M_R = 26.14 M = 3.14 SD = 0.38	M_R = 55.43 M = 3.80 SD = 0.96	M_R = 73.64 M = 4.28 SD = 0.83	$H(2) = 16.64$, $d = 0.72$ $F(2,127) = 8.38$, $d = 0.73$
Item 4	M_R = 24.43 M = 2.57 SD = 0.98	M_R = 51.98 M = 3.49 SD = 1.12	M_R = 77.64 M = 4.25 SD = 0.87	$H(2) = 24.44$, $d = 0.93$ $F(2,127) = 15.68$, $d = 0.99$
Item 5	M_R = 17.14 M = 1.71 SD = 0.76	M_R = 44.68 M = 2.79 SD = 1.02	M_R = 82.20 M = 4.03 SD = 0.97	$H(2) = 43.64$, $d = 1.40$ $F(2,127) = 34.64$, $d = 1.48$
Item 6	M_R = 18.43 M = 2.57 SD = 0.79	M_R = 49.06 M = 3.64 SD = 1.15	M_R = 80.00 M = 4.55 SD = 0.68	$H(2) = 35.91$, $d = 1.21$ $F(2,127) = 26.79$, $d = 1.30$
Item 7	M_R = 22.86 M = 2.29 SD = 1.11	M_R = 58.21 M = 3.66 SD = 1.31	M_R = 73.93 M = 4.21 SD = 1.08	$H(2) = 16.33$, $d = 0.71$ $F(2,127) = 10.40$, $d = 0.81$
Item 8	M_R = 40.86 M = 2.71 SD = 0.95	M_R = 45.79 M = 2.94 SD = 0.87	M_R = 79.29 M = 3.81 SD = 0.90	$F(2,127) = 16.48$, $d = 1.02$
Item 9	M_R = 33.57 M = 2.57 SD = 1.27	M_R = 52.65 M = 3.34 SD = 1.31	M_R = 76.39 M = 4.16 SD = 1.05	$H(2) = 18.38$, $d = 0.77$ $F(2,127) = 11.24$, $d = 0.84$
Item 10	M_R = 23.00 M = 3.00 SD = 0.00	M_R = 53.12 M = 3.66 SD = 1.11	M_R = 77.07 M = 4.36 SD = 0.80	$H(2) = 23.68$, $d = 0.91$ $F(2,127) = 13.39$, $d = 0.92$
Item 11	M_R = 35.50 M = 3.29 SD = 1.25	M_R = 49.60 M = 3.79 SD = 1.12	M_R = 78.10 M = 4.61 SD = 0.66	$H(2) = 25.59$, $d = 0.96$ $F(2,127) = 16.70$, $d = 1.02$
Item 12	M_R = 25.64 M = 1.71 SD = 0.76	M_R = 45.61 M =2.43 SD = 1.04	M_R = 81.47 M = 3.66 SD = 1.16	$H(2) = 36.33$, $d = 1.22$ $F(2,127) = 24.11$, $d = 1.23$

Note. All statistical tests reached significance on a level of $p < .001$.

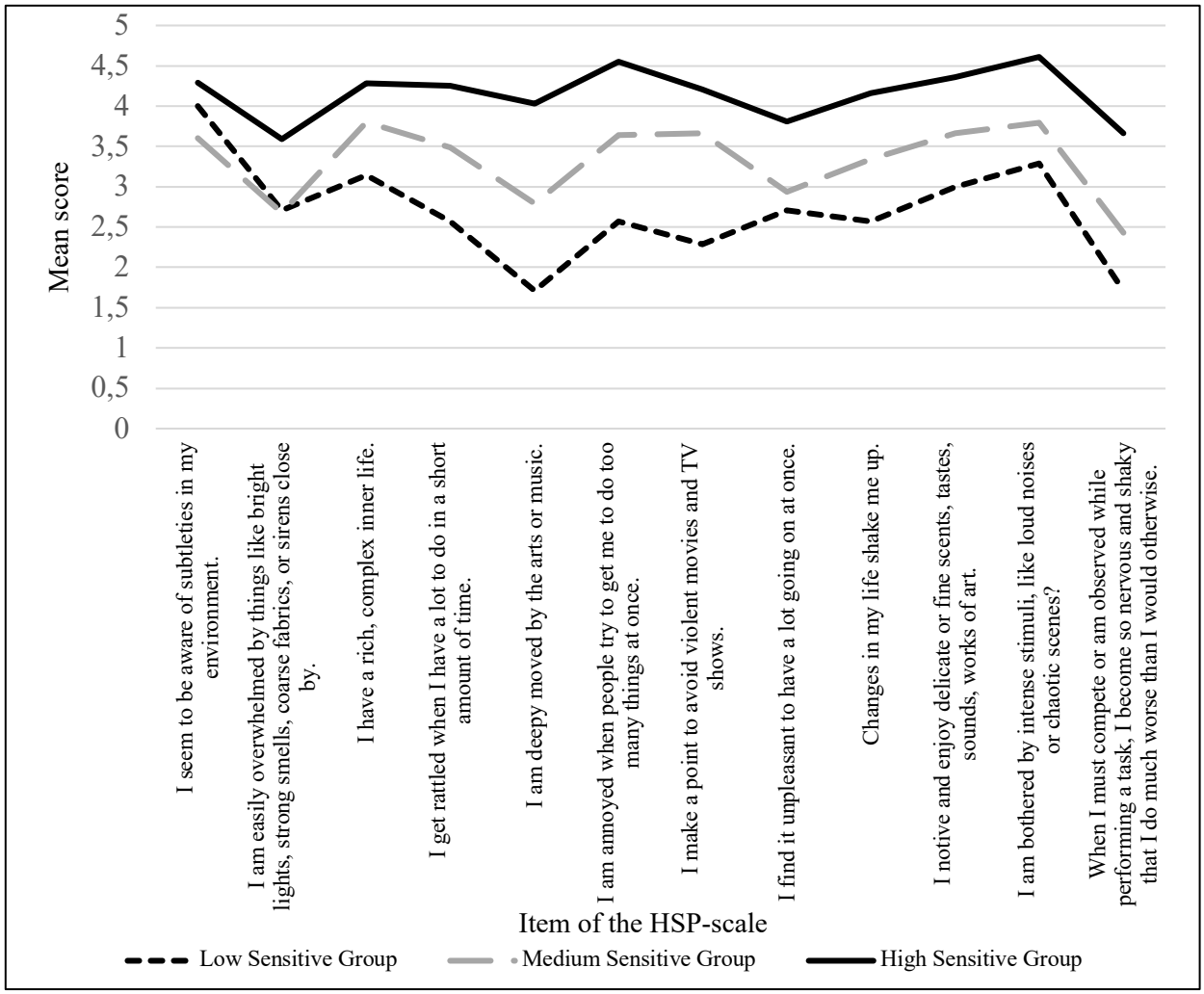

Figure 33. Distribution of the three resulting sensitivity groups across all items on the HSP scale.

Summary of Research question 1.6

Results based on the LCAs conducted with the non-clinical sample suggested the existence of two sensitivity groups in the data. However, these two groups were found to have a similar distribution of their mean scores, which did not allow a meaningful detection of cut-off scores. In order to still be able to compare different sensitivity groups, the non-clinical sample was divided into three groups and cut-off-scores of 2.83 and 3.58 were found. Applying those cut-off scores to the clinical sample revealed a distribution of 5.40%, 36.20% and 58.50% for the low sensitive group, the medium sensitive group and the high sensitive group respectively, which deviates from the original suggestion. For both samples, all the low and medium sensitive groups did not differ significantly on almost any item, while some of the differences between the low and the high sensitive groups were not significant either.

8.2.2. Part 2: Sensory-processing sensitivity and the teaching workplace – Analyses based on the non-clinical data set.

This second part of the Results section aimed at investigating the role of SPS in the teaching work place and the teachers' perceptions of related characteristics. Specifically, this section includes the validation of the newly developed scale which aims to connect characteristics of SPS and of the teaching profession. Subsequently, the associations between SPS and certain characteristics related to the working environment of teachers is analyzed and further validated through the comparison of the three sensitivity groups.

8.2.2.1. Investigating the internal structure of the newly developed scale connecting sensory-processing sensitivity with aspects of the teaching profession.

Research question 2.1: Can the theoretically hypothesized internal structure of the scale connecting sensitivity and workplace characteristics be supported in the (non-clinical) data set?

This research question aimed at understanding the internal consistency and the factorial structure of the newly developed scale, which focuses on the connection between characteristics of the trait of SPS and teachers' sperception of workplace characteristics. In order to answer this question, a CFA was conducted. In case the structure was not supported by the data of the present study, it was investigated in more detail applying an exploratory approach (i.e., EFA). The resulting factorial structure was further validated by comparing participants' scores on the sub-scales between the three sensitivity groups. The structure of the suggested model and the items that were assumed to relate to the two factors were described in the Methods section (see chapter 7.5.6.).

Hypothesis 2.1A: The fit indices of a confirmatory factor analysis support the hypothesized structure with two sub-scales focusing on teachers' perceived attunement to students and deeper processing of teaching-related aspects.

The CFA revealed no evidence for the fact that the model fits the data of the present study: The general model fit index ($\chi^2(26) = 52.46$, $p < .01$) as well as the relative fit indices did not reach scores that would be interpreted as good or acceptable (*CFI* = .75, *RMSEA* = .07, *NFI* = .63). Therefore, in a second step, an EFA was conducted as well.

Research question 2.1B: How many factors can be extracted (based on exploratory analyses) based on the newly developed items measuring teachers' perceived attunement to students and deeper processing of teaching-related aspects?

An EFA (i.e., principal component analysis) was applied in order to determine the number of factors that could be extracted based on the newly developed items. Because the main aim was to reveal two separate factors, an orthogonal rotation (i.e., Varimax) was applied. The following assumptions and requirements were checked:

- the minimum required sample size was 45 participants;
- all items were measured on an interval level (i.e., a Likert scale);
- no correlations were found to be too high or too low; Bartlett's test of Sphercity ($\chi^2(36) = 137.39$, $p < .001$) was significant, indicating a sufficient size of correlations. Additionally, the KMO revealed a result of .61 that can be interpreted as good (e.g., Field, 2009, p. 647);
- finally, variables should roughly follow a normal distribution. This was checked using the *z*-scores for skewness and kurtosis (see chapter 7.7.1.). Resulting scores revealed that for all but two items, the standardized scores exceeded the critical threshold (i.e., +1.96 and -1.96). Therefore, the results revealed based on the present data cannot be generalized and should be interpreted with caution.

Results supported the extraction of two factors, explaining 38.21% of the variance. In the rotated solution, the items reached factor loadings between .45 and .78 (i.e., all factor loadings below .40 were suppressed). However, the resulting two-factor solution differed significantly from the original hypothesized structure, which can be seen by the mixture of items of the two original sub-scales in both factors (see Table 35 below).

Table 35

Rotated Factor Loadings for Exploratory Factor Analysis and Original Sub-Scale of Items Measuring Connections Between Characteritics of SPS and the Teaching Work Place

Item	Original sub-scale	(Rotated) factor loading
Factor 1: Sensitivity-related teaching skills		
I sense when a particular student needs help.	Attunement to students	.70
I think I have made good decisions as a teacher.	Deeper processing	.64
I feel attuned to my students.	Attunement to students	.56
I sense what will happen in a classroom almost before it happens.	Attunement to students	.47
One of my strengths as a teacher is my creativity.	Deeper processing	.45
Cronbach's α = .49		
Factor 2: (Emotional) information processing		
When a student is upset, I am affected almost as much as the student is, whether I show it or not.	Attunement to students	.78
When a student succeeds in a major way, I am so happy that it is almost as though it has happened to me.	Attunement to students	.62
I think deeply about how I have taught and will teach.	Deeper processing	.48
I feel especially attuned to particular students who need help.	Attunement to students	.45
Cronbach's α = .45		

The following factor names and descriptions were made based on the factor structure:

- Sensitivity-related teaching skills (Factor 1): these items included details about more general perceptions of skills that are important in the teaching profession and to the construct of SPS, such as noticing when a student needs help and controlling what is happening in the classroom. This was also particularly represented by the two items that originally were assigned to the sub-scale Deeper processing.
- In comparison, (Emotion) information processing (Factor 2) included more items on empathy and the emotional part of SPS. The item "I think deeply about how I have taught and will teach" could be interpreted in a way that it includes the aspects of providing individual support and using methods that fulfill the students' needs.

It is important to note that the factor loadings were relatively low, which further led to very low, unacceptable scores of internal consistency. Therefore, the two factors could not be applied in further analyses. Instead, further analyses were conducted at item-level.

Research question 2.1C: How strongly is SPS correlated with these two factors and the individual items?

Table 36 below represents an overview of resulting correlations between SPS and the two factors as well as the individual items.

Table 36

Summary of Correlation Coefficients Between SPS and Individual Items Measuring Connections Between Characteristics of SPS and the Teaching Work Place

Item	Correlation coefficient (r / r_{Sp})
I sense when a particular student needs help.	*r = .22*** *r_{Sp} = .23***
I feel attuned to my students.	r = 0.03, n.s. r_{Sp} = .05, n.s.
I sense what will happen in a classroom almost before it happens.	r = 0.07, n.s. r_{Sp} = .04, n.s.
When a student is upset, I am affected almost as much as the student is, whether I show it or not.	*r = .26****
When a student succeeds in a major way, I am so happy that it is almost as though it has happened to me.	r = -.03, n.s. r_{Sp} = -.03, n.s.
I feel especially attuned to particular students who need help.	*r = .17**
I think I have made good decisions as a teacher.	*r* = -.15* r_{Sp} = -.14, n.s.
One of my strengths as a teacher is my creativity.	r =0.14, n.s. r_{Sp} = 0.14, n.s.
I think deeply about how I have taught and will teach.	r = .05, n.s. r_{Sp} = .03, n.s.
Factor 1: Sensitivity-related teaching and pedagogical skills	r = .12, n.s.
Factor 2: (Emotional) information processing	*r = .19***

Note. Italicized items, factors and correlation coefficients represent those that reached statistical significance across statistical tests; n.s. = not significant.
*p < .05; **p < .01.

It can be seen that SPS was significantly correlated with the second factor, (Emotional) information processing, and three individual items (i.e., italicized in the table above). However, all coefficients showed small effect sizes.

Hypothesis 2.1D: Compared to the low and medium sensitive groups, participants in the high sensitive group report higher scores on average on the items originally assumed to measure attunement to students.

As before, a second step was the validation of the results regarding differences between groups. However, different than in previous analyses, the upcoming comparisons between sensitivity groups will be conducted on all individual items again (i.e., not just those that became significant), since the scale was developed with HSPs in mind and in order to not miss any information. In order to conduct an ANOVA on these individual items, they were analyzed regarding their distribution. In particular, it was found that the items "I feel especially attuned to particular students who need help" and "When a student is upset, I am affected almost as much as the student is, whether I show it or not" did not significantly deviate from a normal distribution as measured based on the standardized *z*-scores of skewness and kurtosis. Because the variances were equal between groups on these two items, only an ANOVA was applied for these two items. With the remaining items, the non-parametric Kruskal-Wallis test was applied. Table 37 summarizes these findings.

Table 37

Mean Ranks, Mean Scores, Standard Deviations, and Statistical Differences between Sensitivity Group on Items Measuring Attunement to Students

Item	Mean (*M*), Standard deviation (*SD*), and Mean rank (M_R)	Results of statistical test and effect size
I sense when a particular student needs help.	*M_{LSG} = 3.08, SD_{LSG} = 0.55, $M_{R\text{-}LSG}$ = 51.21* *M_{MSG} = 3.09, SD_{MSG} = 0.43, $M_{R\text{-}MSG}$ = 54.46* *M_{HSG} = 3.37, SD_{HSG} = 0.56, $M_{R\text{-}HSG}$ = 72.89*	*$H(2) = 12.45^{**}$* *$d = 0.49$* *$F(2,186) = 6.05^{**}$* *$d = 0.51$*
I feel attuned to my students.	M_{LSG} = 3.38, SD_{LSG} = 0.56, $M_{R\text{-}LSG}$ = 63.86 M_{MSG} = 3.44, SD_{MSG} = 0.52, $M_{R\text{-}MSG}$ = 66.26 M_{HSG} = 3.43, SD_{HSG} = 0.61, $M_{R\text{-}HSG}$ = 65.18	$H(2)$ = 0.42, n.s. d = 0.19 $F(2,186)$ = 0.20, n.s. d = 0.09
I sense what will happen in a classroom almost before it happens.	M_{LSG} = 2.66, SD_{LSG} = 0.71, $M_{R\text{-}LSG}$ = 84.00 M_{MSG} = 2.81, SD_{MSG} = 0.55, $M_{R\text{-}MSG}$ = 59.05 M_{HSG} = 2.73, SD_{HSG} = 0.72, $M_{R\text{-}HSG}$ = 67.78	$H(2)$ = 1.30, n.s. d = 0.12 $F(2,186)$ = 0.94, n.s. d = 0.20
When a student succeeds in a major way, I am so happy that it is almost as though it has happened to me.	M_{LSG} = 3.23, SD_{LSG} = 0.64, $M_{R\text{-}LSG}$ = 66.14 M_{MSG} = 3.18, SD_{MSG} = 0.69, $M_{R\text{-}MSG}$ = 65.04 M_{HSG} = 3.12, SD_{HSG} = 0.74, $M_{R\text{-}MSG}$ = 65.72	$H(2)$ = 0.62, n.s. d = 0.17 $F(2,186)$ = 0.232, n.s. d = 0.11
When a student is upset, I am affected almost as much as the student is, whether I show it or not.	*M_{LSG} = 2.13, SD_{LSG} = 0.74* *M_{MSG} = 2.35, SD_{MSG} = 0.77* *M_{HSG} = 2.65, SD_{HSG} = 0.84*	*$F(2,186) = 5.71^{**}$* *$d = 0.50$*

(continued)

Item	Mean (*M*), Standard deviation (*SD*), and Mean rank (M_R)	Results of statistical test and effect size
I feel especially attuned to particular students who need help.	$M_{LSG} = 2.96$, $SD_{LSG} = 0.65$ $M_{MSG} = 3.18$, $SD_{MSG} = 0.60$ $M_{HSG} = 3.27$, $SD_{HSG} = 0.70$	$F(2,186) = 3.30$* $d = 0.38$

Note. LSG = low sensitive group; MSG = medium sensitive group; HSG = high sensitive group; italicized items and statistical scores represent those that reached statistical significance on all tests conducted.
*p < .05; **p < .01.

The results in Table 37 above reveal that the results from the correlation analyses were replicated such that the sensitivity roups only differed on three items measuring attunement to students even though they had small effect sizes. The following describes these relationships:

- On the item "I sense when a particular student needs help", the Dunn-Bonferroni post-hoc test revealed that the low and the high sensitive group as well as the medium and the high sensitive group differed significantly from one another ($p_a < .01$).
- Furthermore, the low and the high sensitive group differed significantly from each other ($p < 01$) on the item "When a student is upset, I am affected almost as much as the student is, whether I show it or not" as revealed by Hochberg's GT2 post-hoc test.
- A third item that revealed a significant ANOVA-result was "I feel especially attuned to particular students who need help". However, Hochberg's GT2 post-hoc tests revealed that the low and the high sensitive group differed significantly from each other on that item ($p < .05$).

With regard to the research question, it can be said that the high sensitive group differed significantly from the remaining two groups on all three items stated above. The hypothesis was, therefore, only partially supported.

Hypothesis 2.1E: Compared to the other groups, participants in the high sensitive group report higher scores on average on the items originally assumed to measure aspects of deeper information processing.

In order to answer this research question, the same procedure as the one described above was applied. The only difference were the items of interest, which were the ones measuring the hypothesized deeper processing aspects important for people with high sensitivity levels in the teaching profession. The results can be found in Table 38 below.

Table 38

Mean Ranks, Mean Scores, Standard Deviations and Statistical Differences between Sensitivity Group on Items Measuring Deeper Information Processing

Item	Mean (M), Standard deviation (SD), and Mean rank (M_R)	Results of statistical test and effect size
I think I have made good decisions as a teacher.	M_{LSG} = 3.43, SD_{LSG} = 0.50, $M_{R\text{-}LSG}$ = 102.86 M_{MSG} = 3.36, SD_{MSG} = 0.51, $M_{R\text{-}MSG}$ = 96.80 M_{HSG} = 3.22, SD_{HSG} = 0.50, $M_{R\text{-}HSG}$ = 83.83	H(2) = 4.66, n.s. d = 0.24 F(2,127) = 2.56, n.s. d = 0.33
One of my strengths as a teacher is my creativity.	M_{LSG} = 2.85, SD_{LSG} = 0.77, $M_{R\text{-}LSG}$ = 82.52 M_{MSG} = 3.09, SD_{MSG} = 0.81, $M_{R\text{-}MSG}$ = 98.51 M_{HSG} = 3.16, SD_{HSG} = 0.73, $M_{R\text{-}HSG}$ = 102.13	H(2) = 4.65, n.s. d = 0.24 F(2,186) = 2.37, n.s. d = 0.32
I think deeply about how I have taught and will teach.	M_{LSG} = 2.87, SD_{LSG} = 0.74; $M_{R\text{-}LSG}$ = 96.67 M_{MSG} = 2.81, SD_{MSG} = 0.82; $M_{R\text{-}MSG}$ = 94.81 M_{HSG} = 2.80, SD_{HSG} = 0.85; $M_{R\text{-}HSG}$ = 93.59	H(2) = 0.10, n.s. d =0.20 F(2,186) = 0.10, n.s. d = 0.06

Note. LSG = low sensitive group; MSG = medium sensitive group; HSG = high sensitive group; n.s. = not significant.

Following the procedure above, it was found that the sensitivity groups did not differ significantly on any of the items measuring the aspect of deeper processing in the teaching context.

Summary of Research question 2.1

The two-factor model of the newly developed scales that were assumed to represent a connection between sensitivity and the teaching context was not supported by the CFA conducted. A subsequently applied EFA was also not able to reveal a valid and reliable factor structure based on the respective items. Therefore, further analyses were conducted on the item-level separately for items that measured Attunement to students and the aspect of Deeper processing. On average, participants in the high sensitive group perceived themselves as being more attuned to students than the remaining groups. Particular differences on the respective items were statistically significant specifically when compared to the low sensitive group. Only on one item (i.e., “I sense, when a particular student needs help”) did the high sensitive group differ significantly from the medium sensitive group. These results supported a previous correlation analysis.

8.2.2.2. Perceived performance, the distribution across sensitivity groups and the moderating role of strain.

Research question 2.2: How is perceived performance distributed across the three sensitivity groups and what role does perceived stress play?

Research question 2.2 aimed at investigating whether teachers with higher levels of SPS perceived themselves as successful as teachers in the other two groups (Research question 2.2A). Furthermore, it was investigated whether perceived stress might affect teachers' perceptions of their own performance (Research question 2.2B).

Research question 2.2A: Do the three sensitivity groups differ with regard to teachers' perceived performance?

Because the assumption of normality of scores on the variable measuring perceived performance was not normally distributed across the three sensitivity groups, the non-parametric Kruskal-Wallis test was conducted and was further expanded with the results of a one-way ANOVA.

The Kruskal-Wallis test ($H(2) = 5.45$, n.s.) revealed a non-significant result. All three sensitivity groups had similar mean scores ($M_{HSG} = 3.37$, $SD_{HSG} = 0.34$; $M_{MSG} = 3.30$, $SD_{MSG} = 0.35$; $M_{LSG} = 3.17$, $SD_{LSG} = 0.40$). Although the ANOVA ($F(2,186) = 3.94$, $p < .05$, $d = 0.41$) and the post hoc tests revealed that the low and the high sensitive group differed significantly from each other, this finding will be disregarded due to the fact that assumptions were not met.

Research question 2.2B: Does decreased psychological well-being (i.e., operationalized using Depression, Anxiety, and Stress in the present study) moderate the relationship between SPS and perceived performance?

SPS significantly predicted perceived performance ($F(1,187) = 7.28$, $p < .01$, eta = 0.037; $\beta = -.194$, $t(187) = -2.70$, $p < .01$) and explained 3.20% of the variance of perceived performance. Regarding the three variables of psychological well-being, the following results were revealed:

- Stress significantly predicted perceived performance ($F(1,187) = 17.91$, $p < .001$, $\eta = 0.09$; $\beta = -.296$, $t(187) = -4.23$, $p < .001$). The variance explained is 8%.

- A similar result was found with Anxiety: A regression analysis revealed a significant result ($F(1,187) = 15.15$, $p < .001$, $\eta = 0.08$). Anxiety was able to significantly explain 7% of the variance within perceived performance ($\beta = -.27$, $t(187) = -3.89$, $p < .001$), and
- for Depression ($F(1,187) = 22.29$, $p < .001$, $\eta = 0.11$; $\beta = -.33$, $t(187) = -4.72$, $p < .001$). The variance explained reached a value of 10.20%.

In order to answer Research question 2.2B, three moderation analyses were conducted. The results as follows:

- Stress did not moderate the relationship between SPS and perceived performance in teachers. Despite the significance of the model ($F(3,185) = 6.14$, $p < .001$; $R^2 = .09$), the interaction effect of SPS and Stress did not account for a significant proportion of variance within perceived performance ($t(187) = 0.33$, n.s.).
- This was also true for Anxiety: While the general model revealed significance ($F(3,185) = 6.59$, $p < .001$, $R^2 = .10$), the interaction effect did not reveal a significant value ($t(187) = 1.80$, n.s.),
- Finally, Depression was also not a significant moderator ($F(3,185) = 8.26$, $p < .001$; $R^2 = .12$; for the interaction effect: $t(187) = 1.39$, n.s.).

When conducting the analyses mentioned above based on the standardized scores of the variables in the model, the results did not change significantly (i.e., they revealed similar results).

Research question 2.2C: Does decreased psychological well-being (i.e., operationalized using Depression, Anxiety, and Stress in the present study) moderate the relationship between SPS and perceived performance when only taking into account the high sensitive group in the non-clinical sample?

As part of preliminary analyses, SPS did not significantly predict perceived performance ($F(1,49) = 0.51$, n.s.; $\beta = .03$, $t(49) = 3.89$, $p < .001$) and was only able to explain 0.10% of the variance within perceived performance. Due to this non-significant relationship between SPS and perceived performance (i.e., also supported by a non-significant correlation coefficient of $r_{sp} = -.02$, n.s.) in the high sensitive group of the non-clinical sample, no moderation analysis could be conducted as this is one of the conditions and assumptions. A significant relationship

between SPS and perceived performance would have been needed to meet the underlying assumption for moderation analyses (e.g., Hayes, 2018).

Summary of Research question 2.2

Research question 2.2 aimed at investigating perceived performance in more detail. When comparing the three sensitivity groups regarding participants' perceived performance as teachers, those assigned to the high sensitive group on average reported lower scores than participants in the remaining two groups, which did not support the relevant hypothesis. However, the difference was not statistically significant. A hypothesized effect of psychological well-being, measured with Depression, Anxiety, and Stress in the present study, was not statistically supported, and could not be conducted solely based on the high sensitive group due to the violation of assumptions; specifically, no significant relationship between SPS and perceived performance was found for this part of the sample.

8.2.2.3. Associations between sensory-processing sensitivity and different characteristics of the teaching work place and differences between sensitivity groups based on the scale level.

Research question 2.3: How is SPS related with specific characteristics of the teaching profession and how do the three sensitivity groups differ in this regard?

Research question 2.3 aimed at investigating associations between SPS and the different characteristics of the teaching profession as investigated above (see Research question 2.1.), which were subsequently validated through an investigation of differences between the three sensitivity groups across those scales. Based on the preliminary results, only scales with acceptable internal consistencies were analyzed. Furthermore, only aspects that are assumed to be important to people with high levels of sensitivity were applied (see chapter 5.1.). Table 39 summarizes the resulting correlation coefficients found between SPS and the different scales. Only two out of four sub-scales revealed a statistically significant relationship with SPS (i.e., Balance between work and personal life and Lack of task completion). Both are italicized in the table.

Table 39

Summary of Correlation Coefficients for Associations between SPS and Work Place Characteristics

Sub-scale	Correlation coefficient (r / r_{Sp})
Balance between work and personal life.	*r = .37***; r_{Sp} = .37****
Lack of task completion.	*r = .31***; r_{Sp} = .32****
Educational freedom	r = .14*; r_{Sp} = -.14, n.s.
Relationship with students	r = .12, n.s.
Work-life balance	*r = .33***; r_{Sp} = .33****
Lack of Feedback	*r = .20***

Note. The italicized items and correlation coefficients represent those that reached statistical significance on all tests conducted.
*p < .05; **p < .01.

As described above, the second step included the investigation of differences between the three sensitivity groups across these scales. Since the present study focuses on teacher professionalism, all four sub-scales (i.e., only those related to specific characteristics of the work place) were analyzed again, despite their non-significant results.

Since it was previously found that the distributions of scores measuring characteristics of the teaching workplace did not follow a normal distribution in the three groups (i.e., with the exception of the scale measuring Lack of feedback). Therefore, the hypotheses were answered using the Spearman correlation coefficient and the non-parametric Kruskal-Wallis H test. As a post-hoc procedure, the Dunn-Bonferroni test was applied based on a Bonferroni-adjusted Type I error rate. Resulting p-values that are reported are adjusted. For the sake of completeness, the results of a one-way ANOVA are also reported. As a post-hoc procedure, for the one-way ANOVA, Hochberg's GT2 was used, because the variances were assumed to be equal across groups.

Aspect of Two Work Places

Hypothesis 2.3A: On average, teachers in the high sensitive group report higher scores on the sub-scale Balance between work and personal life than the other two groups.

The independent-samples Kruskal-Wallis test revealed a significant result (H(2) = 20.73, p < .001, d = 0.70). The pairwise comparisons revealed that the Low (M = 2.35,

SD = 0.75) and the high sensitive group (*M* = 2.97, *SD* = 0.65; $p < .001$) as well as the medium (*M* = 2.58, *SD* = 0.60) and high sensitive group ($p < .01$) differed significantly from each other in their mean scores. This was further supported by a significant result of the one-way ANOVA ($F(2,186) = 11.70$, $p < .001$, $d = 0.71$). The Hochberg's GT2 post hoc test supported the aforementioned pairwise comparisons on a level of $p < .01$. This hypothesis was thus fully supported.

Aspect of Openness of Tasks / Lack of Task Completion

Hypothesis 2.3B: On average, teachers in the high sensitive group report higher scores on the sub-scale Lack of task completion than the other two groups.

Results of the Kruskal-Wallis H test suggested the rejection of the null hypothesis ($H(2) = 15.95$, $p < .001$, $d = 0.57$), indicating that the distribution of means are different. The pairwise comparisons suggest that only the low sensitive group (*M* = 2.75, *SD* = 0.88) and the high sensitive group (*M* = 3.26, *SD* = 0.80) differed significantly ($p < .001$) from each other (with the high sensitive group reaching higher average scores than the low sensitive group). The one-way ANOVA supported the significance of the overall difference ($F(2,186) = 8.39$, $p < .001$, $d = 0.60$) and the post-hoc result. Based on the results, this hypothesis was partially supported.

Aspect of Educational Freedom

Research question 2.3C: On average, do teachers in the high sensitive group report higher scores on the sub-scale Educational freedom than the other two groups?

The non-significant result of the Kruskal-Wallis test suggested that the distribution of scores on this sub-scale was similar across the three groups ($H(2) = 4.33$, n.s.). Results from the one-way ANOVA supported this finding ($F(2,186) = 1.78$, n.s.).

Aspect of Work with and Influence on Students

Hypothesis 2.3D: On average, teachers in the high sensitive group report higher scores on the sub-scale Relationship with students than the other two groups.

The Kruskal-Wallis test revealed a non-significant result ($H(2) = 2.40$, n.s.), suggesting the null hypothesis should be maintained and therefore did not support the hypothesis. As was the case for hypothesis 2.3C, the ANOVA results revealed a non-significant coefficient, supporting the results of the Kruskal-Wallis test ($F(2,186) = 1.67$, n.s.). It can therefore be said that hypothesis 2.3D was not supported based on the present data set.

Work-Life Balance

Hypothesis 2.3E: On average, teachers in the high sensitive group report lower scores on the scale measuring work-life balance than the other two groups.

On the scale measuring work-life balance (i.e., Syrek et al., 2011), the groups differed significantly from each other, as supported by the Kruskal-Wallis test ($H(2) = 14.94$, $p < .01$, $d = 0.55$) and the one-way ANOVA ($F(2,186) = 6.59$, $p < .01$, $d = 0.53$). In particular, the low ($M = 4.11$, $SD = 1.28$) and the high sensitive group ($M = 3.31$, $SD = 1.11$, $p_a < .001$) differed significantly from each other, which significantly, although only partially, supported hypothesis 2.3E.

Lack of Feedback

Research question 2.3F: On average, do teachers in the high sensitive group score higher on the scale measuring Lack of feedback than the other two groups?

The three sensitivity groups were found to differ significantly from each other ($F(2,186) = 4.77$, $p < .05$, $d = 0.11$). In particular, it was found that the low sensitive group ($M = 2.44$, $SD = 0.57$) and the high sensitive group ($M = 2.76$, $SD = 0.62$, $d = 0.54$) differed significantly from each other ($p < .05$). This was also true for the difference between the medium ($M = 2.47$, $SD = 0.58$) and the high sensitive group ($d = 0.49$; $p < .05$).

Summary of Research question 2.3

Based on the sub-scales of the newly developed instrument measuring specific work characteristics of the teaching profession, four out of six relationships with SPS were significant and were therefore statistically supported in the comparisons between sensitivity groups. Specifically, two were fully supported and two were only partially supported. People in the high sensitive group found it more difficult to maintain a balance between work and life

and perceived a stronger lack of feedback. Furthermore, they reported higher scores on average on items focusing on the problem of dealing with open, and difficulties feeling a sense of completion with tasks. Regarding the relationship with students and the perceived educational freedom, no differences between the three groups were found.

8.2.2.4. Associations between sensory-processing sensitivity and different characteristics of the teaching work place and differences between sensitivity groups based on the level of individual items.

Research question 2.4: Can exploratory analyses based on the item-level reveal further associations with SPS and differences between the three groups?

Since the reliability measures for the different sub-scales of the instrument measuring the perceived working conditions were relatively low (i.e., some were around .60), the upcoming paragraph aimed at looking at associations with SPS and differences between the three sensitivity groups on the individual item level. As was the case in the previous analyses, the non-parametric alternative Kruskal-Wallis test was applied in cases where assumptions were not met. However, in either case, the results of one-way ANOVAs are additionally reported. The same was true for correlation coefficients that included either the Pearson or the Spearman coefficients.

The first step included basic correlation analyses. The results are summarized in Table 40. While items measuring Exceeding (collaboration) efforts did not show any statistically significant association with SPS, the strongest relationship was found with items on Work-life balance (i.e., such that it is more difficult for people with high levels of SPS) and those related to the openness of tasks. However, they all were weak. The second step included the comparison of sensitivity groups across all these aforementioned individual items.

Table 40

Summary of Correlation Coefficients for Associations Between SPS and Individual Items Measuring Work Place Characteristics

Item	Correlation coefficient (r / r_{Sp})
Aspect of work-life balance due to two work places	
I find it difficult to separate work and private life.	*r = .36***, r_{Sp} = .36****
I find it easy to decide when I am done with my lesson planning.	*r = -.28***, r_{Sp} = -.28****
Aspects of openness of tasks / Lack of task completion and time management	
I find it difficult to estimate when my personal efforts and my engagement suffice.	*r = .28****
I could always do more.	*r = .25**, r_{Sp} = .26****
Relationship with students	
I find it hard to estimate what students need.	r = -.01, n.s., r_{Sp} = .02, n.s.
I find it almost impossible to meet the needs of all student.	*r = .27***, r_{Sp} =.27****
As a teacher I have great influence on students' performance.	r = -.08, n.s.
Lack of feedback	
I miss feedback about long-term effects of my teaching.	r = .04, n.s.
I miss positive feedback from students.	*r = .16**
I miss positive feedback from parents.	*r = .20**, r_{Sp} = .20***
Exceeding (collaboration) efforts	
My profession includes engagement more than the regular extent (e.g., in projects, youth hostels, etc.).	r = -.07, n.s., r_{Sp} =-.05, n.s.
School is not just a work place for me.	r = .11, n.s., r_{Sp} = .13, n.s.
Collaboration with other people	
Collaboration with some people is difficult.	*r = .18*, r_{Sp} = .17**
I cannot choose who I work with.	*r = .29***, r_{Sp} = .29****
Public opinion about the teaching profession.	
Other people judge about the teaching profession, because they have visited as school themselves.	*r = .17*, r_{Sp} = .16**
All people think they can join in a conversation about the teaching profession.	r = .10, n.s., r_{Sp} = .10, n.s.

Note. Italiczed items and results represent those that reached statistical significance across analyses conducted. n.s. = not significant.
*p < .05; **p < .01.

Work-Life Balance due to two Work Places

Hypothesis 2.4A: On average, teachers in the high sensitive group report higher scores on the item "I find it difficult to separate work and private life" than do the other two groups.

The Kruskal-Wallis test ($H(2) = 18.99$, $p < .001$, $d = 0.63$) and the ANOVA ($F(2,186) = 10.53$, $p < .001$, $d = 0.67$) both revealed significant results, both indicating differences between the groups. When comparing all individual groups with each other, the low ($M = 2.15$, $SD = 0.93$) and high sensitive group ($M = 2.98$, $SD = 0.99$, $ps < .001$) as well as the medium ($M = 2.51$, $SD = 0.88$) and the high sensitive group ($ps < .05$) differed significantly from each other, which fully supports this hypothesis.

Hypothesis 2.4B: On average, teachers in the high sensitive group report lower scores on the item "I find it easy to decide when I am done with my lesson planning" than do the other two groups.

All three groups differed on this item significantly ($F(2,189) = 7.01$, $p < .01$) with a weak effect ($d = 0.18$). When looking at Hochberg's post hoc tests the high sensitive group ($M = 2.14$, $SD = 0.92$) reached significantly lower mean scores than the low sensitive group ($M = 2.75$, $SD = 0.92$) and the medium sensitive group ($M = 2.62$, $SD = 0.87$; $ps < .01$), which fully supported this hypothesis.

Openness of Tasks / Lack of Task Completion and Time Management

Hypothesis 2.4C: On average, teachers in the high sensitive group report higher scores on the item "I find it difficult to estimate when my personal efforts and my engagement suffice" than do the other two groups.

The Kruskal-Wallis test supported the assumption of a significant difference between the three groups on the item "I find it difficult to estimate when my personal efforts and my engagement suffice" ($H(2) = 9.07$, $p < .05$, $d = 0.40$). Pairwise comparisons support that the Low ($M = 2.36$, $SD = 0.76$) and the high sensitive group ($M = 2.82$, $SD = 0.82$) differed significantly from each other ($ps < .01$). The subsequently conducted ANOVA supported the result further ($F(2,186) = 4.66$, $p < .05$, $d = 0.45$). Thus, based on the present data set, this hypothesis was partially supported.

Hypothesis 2.4D: On average, teachers in the high sensitive group report higher scores on the item "I could always do more" than do the other two groups.

The results for this hypothesis are similar to the findings above: The two statistical analyses revealed significant results (Kruskal-Wallis test: $H(2) = 10.11$, $p < .01$, $d = 0.43$; ANOVA: $F(2,186) = 4.97$, $p < .01$, $d = 0.46$). Pairwise comparisons and Hochberg's GT2 post hoc test revealed that the low ($M = 2.81$, $SD = 1.00$) and the high sensitive group ($M = 3.37$, $SD = 0.87$) differed significantly from each other ($ps < .01$). Based on these results, this hypothesis was partially supported.

Work with and Influence on Students

Hypothesis 2.4E: On average, teachers in the high sensitive group report higher scores on the item "I find it hard to estimate what students need" than do the other two groups.

The three sensitivity groups did not differ significantly from each other on this item ($H(2) = 0.22$, n.s.; $F(2,186) = .05$, n.s.). It is in support of the previously investigated correlation analysis, but not of this hypothesis.

Hypothesis 2.4F: On average, teachers in the high sensitive group report higher scores on the item "I find it almost impossible to meet the needs of all students" than do the other two groups.

The Kruskal-Wallis test ($H(2) = 12.62$, $p < .01$, $d = 0.49$) and the ANOVA ($F(2,186) = 6.65$, $p < .01$, $d = 0.54$) revealed significant results, both indicating differences between the groups. When comparing all groups with one another, the low ($M = 2.94$, $SD = 0.80$) and the medium sensitive group ($M = 3.34$, $SD = 0.67$, $p_a < .05$) as well as the low and the high sensitive group ($M = 3.41$, $SD = 0.75$, $p_a < .01$) showed significant differences on their mean scores. Because the high sensitive group only differed significantly from the low sensitive group, this hypothesis was only partially supported.

Hypothesis 2.4G: On average, teachers in the high sensitive group report higher scores on the item "As a teacher I have great influence on students' performance" than do the other two groups.

Both statistical tests supported a significant difference on the item "As a teacher I have great influence on students' performance" ($H(2) = 12.62$, $p < .01$, $d = 0.49$; $F(2,186) = 6.65$, $p < .01$, $d = 0.11$). In partial support of this hypothesis, the low sensitive group ($M = 2.94$, $SD = 0.80$) and the medium sensitive group ($M = 3.34$, $SD = 0.67$, $p < .05$) as well as the low sensitive

group and the high sensitive group (M = 3.41, SD = 0.75, p < .01) differed significantly from each other with participants in the high sensitive group havingg the highest mean scores.

Lack of Feedback

Research question 2.4H: On average, do teachers in the high sensitive group report higher scores on the item "I miss feedback about long-term effects of my teaching" than do the other two groups?

As was the case in the correlational analyses above, the comparison of sensitivity groups did not lead to a significant result (F(2,186) = 0.17, n.s.).

Research question 2.4I: On average, do teachers in the high sensitive group report higher scores on the item "I miss positive feedback from students" than do the other two groups?

The three groups differed significantly from each other (F(2,186) = 5.45, p < .01, d = 0.16) with a small effect. Specifically, the high sensitive group (M = 2.47, SD = 0.83) reached significantly higher scores than the medium sensitive group (M = 2.04, SD = 0.76; p < .01) and the low sensitive group (M = 2.09, SD = 0.71; p < .05).

Research question 2.4J: On average, do teachers in the high sensitive group report higher scores on the item "I miss positive feedback from parents" than do the other two groups?

A difference between the sensitivity groups was statistically significant (F(2,186) = 4.07, p < .05, d = 0.14). Specifically, the high sensitive group (M = 2.92, SD = 0.94) reached higher mean scores than the low sensitive group (M = 2.45, SD = 0.95) and the medium sensitive group (M = 2.51, SD = 0.93; ps < .05).

Exceeding (collaboration) efforts

Research question 2.4K: On average, do teachers in the high sensitive group report higher scores on the item "My profession includes engagement more than the regular extent (e.g., in projects, youth hostels, etc.)" than do the other two groups?

Based on the present data, differences were not supported by the two statistical tests (H(2) = 4.26, n.s.; F(2,186) = 2.26, n.s.).

Research question 2.4L: On average, do teachers in the high sensitive group report higher scores on the item "School is not just a work place for me" than do the other two groups?

In support of the findings of the correlation analyses, but contrary to the hypothesis, the difference between the sensitivity groups did not reach statistical significance ($H(2) = 2.84$, n.s.; $F(2,186) = 2.05$, n.s.).

Collaboration with other people

Research question 2.4M: On average, do teachers in the high sensitive group report lower scores on the item "Collaboration with some people is difficult" than do the other two groups?

On this item, the comparison revealed a significant result ($F(2,186) = 3.63$, $p < .05$, $d = 0.11$). Specifically, only the medium ($M = 2.78$, $SD = 0.95$) and the high sensitive group ($M = 3.16$, $SD = 0.83$) differed from each other.

Research question 2.4N: On average, do teachers in the high sensitive group report lower scores on the item "I cannot chose who I work with" than do the other two groups?

The differences between the three groups on this item were statistical significant on both statistical tests ($H(2) = 20.33$, $p < .001$, $d = 0.66$; $F(2,186) = 9.93$, $p < .001$, $d = 0.14$). Specifically, the high sensitive group ($M = 3.63$, $SD = 0.75$) had significantly higher scores than the medium ($M = 3.11$, $SD = 0.74$, $p < .001$) and low sensitive group ($M = 3.09$, $SD = 0.79$, $p < .01$).

Public opinion about the teaching profession

Research question 2.4O: On average, do teachers in the high sensitive group report lower scores on the item "Other people judge about the teaching profession, because they have visited as school themselves" than do the other two groups?

Despite a significant weak association found between SPS and this item, the difference between the three sensitivity groups were not statistically significant ($H(2) = 4.91$, n.s.; $F(2,186) = 2.18$, n.s.).

Research question 2.4P: On average, do teachers in the high sensitive group report lower scores on the item "All people think they can join in a conversation about the teaching profession" than do the other two groups?

Similar to hypothesis 2.4O, group differences on this item were also not statistically supported ($H(2) = 5.35$, n.s.; $F(2,186) = 2.32$, n.s.).

Summary of Research question 2.4

Hypotheses stated as part of Research question 2.4 aimed at investigating associations between SPS and some characteristics of the teaching environment as well as differences between the three sensitivity groups. In line with theoretical assumptions, most hypotheses were at least partially supported. Only on the scale Exceeding (collaboration) efforts did the three groups not show a significant difference. In particular, participants with high scores on SPS (i.e., those in the high sensitive group) found it much harder to make decisions about lesson-planning or gauge when personal efforts are enough. Furthermore, they seemed to have difficulties keeping their work and their professional lives balanced and had the feeling they could always do more. Regarding their students, the same teachers found it more difficult to meet all the needs of all their students. The overall statistical values had small to intermediate effect sizes.

8.2.2.5. Sensory-processing sensitivity and aspects of expectations.

Research question 2.5: How is SPS associated with the overall scale measuring expectations toward teachers and the individual items?

In this research question, the newly developed scale measuring expectations from different actors within the school context are measured. The individual items and related measures of internal consistency have been described in more detail in the Methods section (see chapter 7.5.5.3.). As was already the case, at first, the correlation analyses were conducted to reveal a possible association with SPS. In order to get a better insight into which aspects (i.e., expectations) are especially important for HSPs, the individual items and their associations with SPS are also investigated as part of this first step. Subsequently, differences between the three sensitivity groups are analyzed.

Hypothesis 2.5A: On average, there is a significant positive association between SPS and the overall scale measuring expectations toward teachers as well as the individual items.

Table 41 below summarizes the results of the correlation analyses conducted. The association of SPS with three items (i.e., "The different roles that I have as a teacher, never let me be "real" or authentic in contact with other people"; "I always adapt my behavior to the profession's demands on me", and "I am aware of the fact that there are different roles I have to take in my everyday school life") did not reach statistical significance, while the remaining six items were significantly related to SPS. However, they all had weak effect sizes. The strongest positive correlation was found with the item "I perceive it as difficult to meet all the expectations that are put toward me as a teacher". Additionally, the total scale measuring these expectations was also significantly related to SPS with the second strongest correlation, but still did not exceed a weak relationship.

Table 41

Summary of Correlation Coefficients for Associations Between SPS and Items Measuring Expectations Toward Teachers

Item	Correlation coefficient (r / r_{Sp})
Total scale	*r = .35***
The different roles that I have as a teacher, never let me be 'real' or authentic in contact with other people.	r = .17* r_{Sp} = .12, n.s.
I always adapt my behavior to the profession's demands on me.	r = .09, n.s. r_{Sp} = .06, n.s.
It has happened frequently that I could not fulfill the expectations that have been put toward me.	*r = .22*** *r_{Sp} = .20***
Often, I am confronted with contradicting expectations.	*r = .21***
Balancing different expectations is difficult for me.	*r = .29*** *r_{Sp} = .29****
In general, I try to adapt to the expectations that are put on me as a teacher.	*r = .21*** *r_{Sp} = .21***
I perceive it as difficult to meet all the expectations, that are put toward me as a teacher.	*r = .38*** *r_{Sp} = .38****
I am aware of the fact that there are different roles I have to take in my everyday school life.	r = .04, n.s. r_{Sp} = .04, n.s.
There are situations, in which I have to show certain behavior or emotions that contradict my beliefs.	*r = .17** *r_{Sp} = .15**

Note. Italiczed items and results represent those that reached statistical significance across analyses conducted; n.s. = not significant.
*p < .05; **p < .01; ***p < .001.

Hypothesis 2.6B: On average, the high sensitive group reaches higher scores than participants in the remaining two sensitivity groups on the general scale and across individual items.

The answers to this hypothesis are also summarized in Table 42. However, only the overall F- or H-score is reported. The respective post-hoc test results are discussed below.

Table 42

Statistical Differences Between Sensitivity Groups on the Total Scale and Individual Items Measuring Expectations Toward Teachers

Item / Scale	Group differences (F-value / H-value)
Total scale	*H(2) = 13.61**, d = 0.52* *F(2,186) = 8.55***, d = 0.09*
The different roles that I have as a teacher, never let me be 'real' or authentic in contact with other people.	*H*(2) = 3.56, n.s. *F*(2,186) = 2.29, n.s.
I always adapt my behavior to the profession's demands on me.	*H*(2) = .05, n.s. *F*(2,186) = 0.14, n.s.
It has happened frequently that I could not fulfill the expectations that have been put toward me.	*H(2) = 8.85*, d = 0.39* *F(2,186) = 4.75*, d = 0.16*
Often, I am confronted with contradicting expectations.	*F*(2,186) = 2.39, n.s.
Balancing different expectations is difficult for me.	*H(2) = 11.73**, d = 0.47* *F(2,186) = 6.76**, d = 0.17*
In general, I try to adapt to the expectations that are put on me as a teacher.	*H(2) = 9.96**, d = 0.42* *F(2,186) = 3.81*, d = 0.09*
I perceive it as difficult to meet all the expectations, that are put toward me as a teacher.	*F(2,186) = 12.55***, d = 0.19*
I am aware of the fact that there are different roles I have to take in my everyday school life.	*H*(2) = 3.34, n.s. *F*(2,186) = 1.19, n.s.
There are situations, in which I have to show certain behavior or emotions that contradict my beliefs.	*F*(2,186) = 2.43, n.s.

Note. Italiczed items and results represent those that reached statistical significance across analyses conducted. n.s. = not significant.
**p* < .05; ***p* < .01; ****p* < .001.

As is shown in Table 42, most results from the correlation analyses were supported in this case as well. Two exceptions, however, are the two items "There are situations in which I have to show certain behavior or emotions that contradict my beliefs" and "Often, I am confronted with contradicting expectations", neither of which revealed significant differences. This is not entirely surprising given that they also revealed one of the weakest associations with SPS in the previous hypothesis. Only item 5 and 7 as well as the total scale fully supported the hypothesis. The following statistically significant differences were found:

- on the third item, the high sensitive group (M = 1.76, SD = 0.84) only differed significantly from the low sensitive group (M = 1.49, SD = 0.58; $p < .01$);
- on item 5: the high sensitive group (M = 2.51; SD = 0.81) differed significantly from the low (M = 2.09, SD = 0.74) and the medium sensitive group (M = 2.08, SD = 0.60; ps < .01);
- on the sixth item, the high sensitive group (M = 3.08, SD = 0.60) only significantly differed from the medium sensitive group (M = 2.80, SD = 0.53; $p_a < .01$);
- as stated above, the hypothesis is fully supported with item 7 on which the high sensitive group (M = 3.27, SD = 0.75) differed significantly from the low sensitive group (M = 2.55, SD = 0.87; $p < .001$) and the medium sensitive group (M = 2.76, SD = 0.70; $p < .01$);
- finally, all three groups differed significantly on the mean score (p_as < .01) in a way that the high sensitive group (M = 2.77, SD = 0.47) reached higher mean scores than the low (M = 2.46, SD = 0.46) and the medium sensitive group (M = 2.52, SD = 0.32).

However, it is important to note that all effect sizes were small to intermediate.

8.2.2.6. Characteristics of teachers' work place, perceived strain and the mediating role of sensory-processing sensitivity.

Research question 2.6: Does SPS mediate the relationship between Work-life balance and Stress?

This upcoming section aims at investigating whether SPS acted as a mediator and could explain the relationship between certain characteristics of the teaching profession (i.e., that are assumed to elevate perceived stress) and the perception of strain and related measures of psychological well-being. The following mediation model is an example of the upcoming mediation models, using the variable of Work-life balance as one of the different characteristics by Rothland (2013) as the independent variable, SPS as the mediator and perceived Stress as the outcome (or dependent) variable. The procedure of a mediation analysis was described in the Methods section and applied here in this way. Figure 34 below represents a graphical depiction of the model.

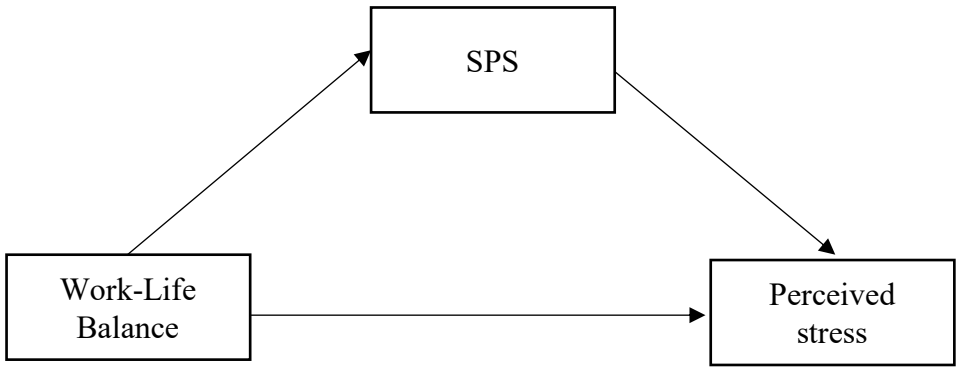

Figure 34. Example of upcoming mediation models with work-life balance representing the independent variable, perceived stress the dependent variable, and SPS (i.e., the HSP mean score) the mediator.

The different upcoming hypotheses are based on the previous findings regarding the association with SPS as well as assumptions that have been made by other researchers about which characteristics might be the most stressful for teachers. While SPS acts as a mediating variable in all the upcoming analyses, and the dependent variable is stress across analyses (i.e., due to the significant strong association with SPS in the non-clinical sample, see chapter 8.2.1.1., the independent variables vary based on previous findings as already stated above. In order to give a concise overview, results are drawn on the mediation model depicted in Figure 34 for each upcoming hypothesis.

Research question 2.6A: Does SPS mediate the relationship between work-life balance (i.e., as measured with the scale by Syrek et al., 2011) and Stress?

The first step of the analysis included looking at the effect of work-life balance (measured with the scale by Syrek et al., 2011) and Stress, which revealed a significant result (b = -0.33, $T(187)$ = -10.08, $p < .001$ without considering the mediator SPS. When controlling for the SPS as the mediator, the relationship decreased slightly (b = -0.27, $t(186)$ = -8.42, $p < .001$). Step 2 shows that the relationship between Stress and the mediator, SPS, was also significant (b = -0.17, $t(1,187)$ = -4.73, $p < .001$). In the third step, it was shown that the effect of the mediator, while controlling for the independent variable, revealed a significant effect as well (b = 0.36, $t(186)$ = 6.07, $p < .001$).

The completely standardized indirect effect reached a score of 0.11 and statistical significance. This was tested using the bootstrapping method (i.e., number of bootstrap samples for percentile bootstrap confidence intervals: 5,000) and determined based on the resulting 95%

confidence interval. Based on the observation that no confidence intervals of the indirect effects (i.e., not standardized, partially standardized and completely standardized) contained the 0, it was assumed to be significant (e.g., Hayes, 2018). Figure 35 below depicts the resulting effects of the model.

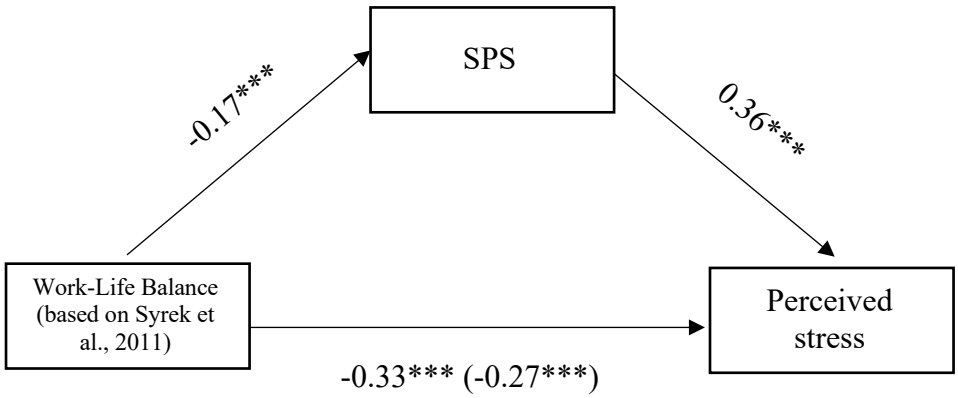

Figure 35. Mediation model of the relationship between work-life balance (i.e., as measured using the scale by Syrek et al. 2011) and perceived stress with SPS as a mediator.

Research question 2.6B: Does SPS mediate the relationship between Work-life balance (i.e., as measured with the self-developed scale based on descriptions by Rothland (2013)) and Stress?

This research question was answered the same way and applying the same procedure as the research question 2.6A. As was the case above, the resulting effects are also depicted in Figure 36 below. The effect of Work-life balance (as measured using the self-developed scale based on conceptualizations by Rothland, 2013) on SPS was found to be significant (b = 0.33, $t(187)$ = 5.52, p < .001). It is important to note that the effect in this analysis is positive, because the scale was phrased in the opposite direction than the scale by Syrek and colleagues (2011). Specifically, this scale focused on the difficulties some teachers have maintaining balance between their work and personal lives. Furthermore, the effect of the mediator SPS on Stress was also found to be statistically significant (b = 0.35, $t(186)$ = 5.59, p < .001), when controlling for the independent variable. Finally, the effect of Work-life balance and perceived stress revealed a score of 0.42 ($t(186)$ = 7.63, p < .001) when controlling for the mediator and 0.53 ($t(187)$ = 9.73, p < .001) without including SPS into the model. In a final step, the indirect effect was calculated. It reached a completely standardized score of 0.12 and was statistically significant as the confidence intervals did not include the 0.

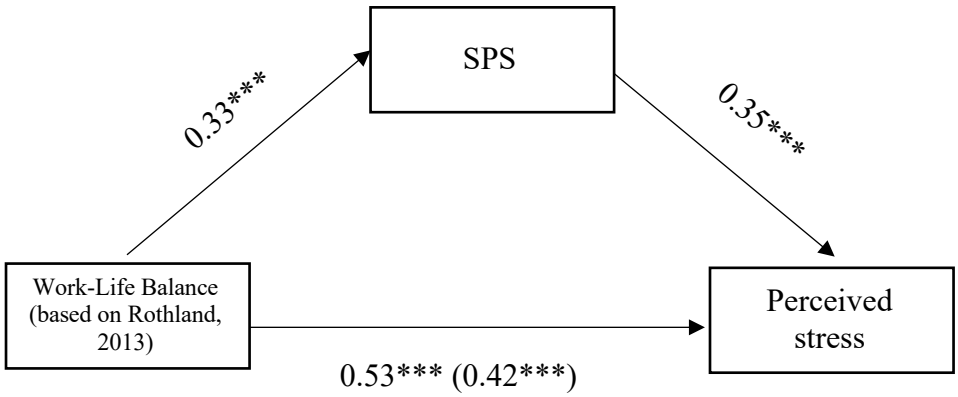

Figure 36. Mediation model of the relationship between work-life balance (i.e., as measured using the self-developed scale based on conceptualizations by Rothland (2013)) and perceived stress with SPS as a mediator.

Research question 2.6C: Does SPS mediate the relationship between Openness of tasks / Lack of task completion (i.e., as measured with the self-developed scale based on descriptions by Rothland (2013)) and Stress?

As shown in Figure 37, the following effects were found: The effect of Openness of tasks (as measured with the self-developed scale based on conceptualizations by Rothland (2013)) on SPS was 0.22 ($t(187) = 4.42$, $p < .001$), while the effect of the mediator on Stress was 0.45 ($t(186) = 6.65$, $p < .001$). Furthermore, the effect of the independent on the dependent variable reached a score of 0.30 ($t(187) = 5.73$, $p < .001$) without controlling for the mediator and decreased when including the mediator into the model ($b = 0.20$, $t(186) = 4.00$, $p < .01$). In a final step, the indirect effect was investigated, which reached 0.13 after standardization. Confidence intervals were found using the bootstrapping method and revealed statistical significance.

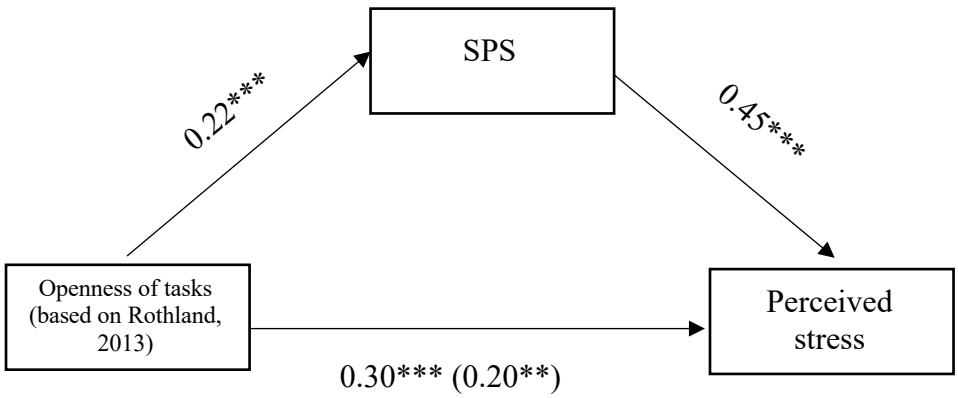

Figure 37. Mediation model of the relationship between openness of tasks (i.e., as measured using the self-developed scale based on conceptualizations by Rothland (2013)) and perceived stress with SPS as a mediator.

Research question 2.6D: Does SPS mediate the relationship between expectations toward teachers (i.e., as measured with the self-developed scale based on descriptions by Rothland (2013)) and Stress?

This final analysis as part of Research question 2.6, followed the same strategy (for an overview, see Figure 38): The effect of the independent variable on the mediator SPS was 0.43 ($t(187) = 3.38$, $p < .01$), and that of the mediator on Stress as the dependent variable reached 0.48 ($t(186) = 7.14$, $p < .001$). When integrating SPS into the model, the effect between expectations and Stress was 0.40 ($t(186) = 3.33$, $p < .01$), without the mediator in the model, this increased to 0.61 ($t(187) = 4.61$, $p < .001$). The completely standardized indirect effect size was 0.11 and revealed statistical significance.

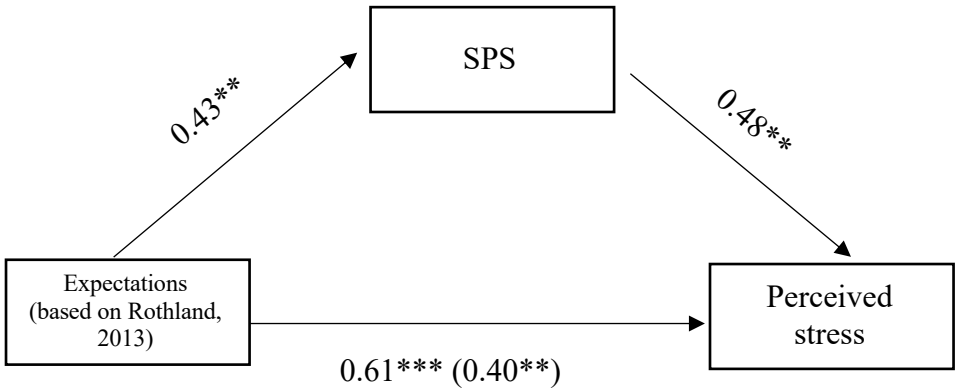

Figure 38. Mediation model of the relationship between expectations toward teachers (as measured using the self-developed scale based on conceptualizations by Rothland (2013)) and perceived stress with SPS as a mediator.

Summary of Research question 2.6

Research question 2.6 aimed at investigating whether SPS mediates the relationship between different workplace characteristics and Stress. Specifically, based on previous findings, Work-life balance, Openness of tasks and expectations towards teachers were included in the mediation models as possible independent variables. Results supported this assumption and revealed evidence for significant partial mediation roles of SPS regarding the association between different work place characteristics and Stress.

8.2.2.7. Sensory-processing sensitivity and aspects of collaboration.

Research question 2.7: How does SPS relate to forms of and teachers' perceived benefits from collaboration?

This section aimed at further investigating how SPS relates to different forms of and perceived benefits from collaboration. It is approached using different kinds of analyses, including correlations, differences between sensitivity groups and, and a cluster analysis. Because there are no existing findings on this relationship, the aforementioned parts of the analyses are exploratory in nature and therefore phrased as questions rather than directed hypotheses.

Research question 2.7A: Can significant relationships between SPS and the different forms of collaboration be found?

As was the case with this study's various research questions above already, the relationships are based on basic correlation analyses (= r) or the Spearman correlation analyses (= r_{sp}), depending on whether the assumptions (i.e., in particular that of a normal distribution) for a basic correlation analysis were met. In cases where Spearman correlation coefficients are reported, Pearson results are also reported for the sake of completeness. In the present data set, SPS followed a normal distribution and therefore did not have to be checked again in line with the first two research questions. In addition, based on a significant correlation between the variable school type and collective organization, it was important to control for school type to ensure it does not influence the proposed relationship between SPS and Collective organization (i.e., a sub-scale measuring a form of collaboration)

Specifically, the following results were revealed:

- SPS and the sub-scale Professional exchange were not significantly correlated with each other (r_{sp} = -.09, n.s.; r = -.05, n.s.).
- The same was true for the sub-scale measuring Student-related exchange: Both analyses revealed non-significant results (r_{sp} = -.05, n.s.; r = -.07, n.s.).
- Collective organization: For this sub-scale, a partial correlation resulted in a non-significant coefficient of -.07. Without controlling for school-type, the effect decreased, but remained insignificant (r_{sp} = -.02, n.s.; r = -.04, n.s.).

- Finally, as was the case for the remaining forms of collaboration above, the scale Co-construction was not significantly related to SPS either (r_{sp} = -.09, n.s.; r = -.06, n.s.).

Research question 2.7B: Can significant relationships between SPS and the different perceived benefits from collaboration be found?

The approach for answering this question is the same as the one described above. The results were as follows:

- the sub-scale Emotional relief was not significantly related to SPS (r_{sp} = -.07, n.s.; r = -.10, n.s.);
- this was also true for the sub-scale measuring Professional gain (r_{sp} = -.09, n.s.; r = -.11, n.s.);
- however, SPS was significantly correlated with Facilitation (r = -.24, p < .01);
- but was not related to the sub-scale measuring Improved student focus (r = -.14, n.s.).

Research question 2.7C: Do the three sensitivity groups differ regarding the aforementioned forms of and perceived benefits from collaboration that revealed a significant relationship with SPS?

This research question was answered using an ANOVA because the standardized scores of skewness and kurtosis did not indicate a significant deviation from a normal distribution. As only the correlation between SPS and Facilitation became significant in Research question 2.7B, only this variable was included in the analysis. In addition to a significant ANOVA ($F(2,186) = 10.39$, $p < .001$, $d = 0.67$), results of post-hoc tests revealed that all groups differed significantly from each other on the variable. Specifically, the low sensitive group perceived the benefit of facilitation the highest (M = 2.85, SD = 0.75), while the high sensitive group reached the lowest values (M = 2.05, SD = 0.80).

Summary of Research question 2.7

This section aimed at investigating whether SPS might be associated with an enhanced or decreased application of collaboration or perceived benefit of collaboration. Across correlation coefficients conducted in line with this research question, only the relationship between SPS and facilitation reached a small negatively statistically significant relationship, indicating a slightly decreased tendency to facilitate in teachers with higher levels of SPS. This was fully

supported in the second step of the analysis, which aimed at a validation through comparisons of sensitivity groups.

8.2.3. Part 3: Sensory-processing sensitivity and mental ill-health – analyses based on the clinical data set.

The goal of this section was to further analyze characteristics of the clinical sample. Specifically, it aims at answering the question of how SPS relates to the additional clinical variables and measures collected. Furthermore, it is of interest in the upcoming chapter, whether there is a relationship between sensitivity group and previous treatment, whether it relates to specific main and secondary diagnoses and whether findings in line with the theory of vantage sensitivity can be generated.

8.2.3.1. Sensory-processing sensitivity and additional clinical variables.

Research question 3.1: How does SPS relate to the additional variables (i.e., scales common in the psychiatric field and length of stay) measured in the clinical sample?

In order to answer this second research question within this third section, correlation analyses (i.e., Pearson or Spearman correlation coefficients, depending on whether particular assumptions were met) were applied to all variables. Of particular interest for this upcoming section were the following specific research questions.

Research question 3.1A: How does SPS relate to the length of patients' incapacity for work in the 12 months prior to admission (in weeks)?

Research question 3.1B: How does SPS relate to patients' sum scores on the GAF scale (Global Assessment of Functioning) the last two months before admission and at release?

Research question 3.1C: How does SPS relate to patients' mean scores on the sub-scales of the BSI (Brief Symptom Inventory; i.e., Somatization, Obsessive compulsion, Interpersonal sensitivity, Depression, Anxiety, Hostility, Phobic anxiety, Paranoid ideation, Psychoticism) as well as the three global scores (Global severity index, Positive symptom distress index, Positive symptom total) at admission and release?

Research question 3.1D: How does SPS relate to patients' sum scores on the sub-scales of the PHQ (Patient Health Questionnaire; i.e., Somatoform disorders, Depressive disorders, Anxiety disorder) at admission and upon release?

Research question 3.1E: How does SPS relate to patients' duration of treatment?

Table 43 below summarizes the results for all statistical tests conducted in line with the respective specific questions A to E. Which results represent which research question is further specified by comments in the respective cells.

Based on previous findings on stress-related variables and SPS, a linear trend of both variables could be assumed. The respective statistical test was applied based on whether the variables deviated significantly from the normal distribution. In cases in which sum scores were available in the analysis, the respective sum scores on the HSP scale were calculated and applied. All variables have been analyzed regarding whether they follow a normal distribution. The results can be found in the Appendix (see Appendix C, Table C3).

Table 43

Summary of Correlation Coefficients for Associations between SPS and Different Variables of Psychological Well-Being (i.e., incapacity for work, GAF scores, BSI sub-scales, and PHQ sum scores) at Admission and Release

Variable correlated with SPS, sub-scale and research question	Result(s)
[1]Incapacity for work within the last 12 months (in weeks) *(Research question 3.2A)*	r = -.04, n.s. r_{sp} = -.01, n.s.
[1]Patients' score on GAF scale two months before admission and at release *(Research question 3.2B)*	Before admission: r = -.03, n.s.; r_{sp} = -.03, n.s. At release: r = -.11, n.s.
Patients' BSI mean score at admission and release; Sub-scale: Somatization *(Research question 3.2C)*	At admission: r = .24*, r_{sp} = .22* At release: r = .17, n.s.; r_{sp} = .08, n.s.
Patients' BSI mean score at admission and release; Sub-scale: Obsessive-compulsive behavior *(Research question 3.2C)*	At admission: r = .37*** At release: r = .11, n.s.; r_{sp} = .15, n.s.
Patients' BSI mean score at admission and release; Sub-scale: Interpersonal sensitivity *(Research question 3.2C)*	*At admission: r = .36***; r_{sp} = .34*** *At release: r = .24*; r_{sp} = .29*** (continued)

Variable correlated with SPS, sub-scale and research question	Result(s)
Patients' BSI mean score at admission and release; Sub-scale: Depression (Research question 3.2C)	*At admission: r = .41***; r_{sp} = .30****
	*At release: r = .17, n.s.; r_{sp} = .28***
Patients' BSI mean score at admission and release; Sub-scale: Anxiety (Research question 3.2C)	*At admission: r = .46***; r_{sp} = .45****
	At release: r = .22; r_{sp} = .26**
Patients' BSI mean score at admission and release; Sub-scale: Hostility (Research question 3.2C)	At admission: r = .22*; r_{sp} = .23*
	At release: r = .08, n.s.; r_{sp} = .08, n.s.
Patients' BSI mean score at admission and release; Sub-scale: Phobic anxiety (Research question 3.2C)	*At admission: r = .43***; r_{sp} = .44****
	*At release: r = .28**; r_{sp} = .34***
Patients' BSI mean score at admission and release; Sub-scale: Paranoid ideation (Research question 3.2C)	At admission: r = .20, n.s.; r_{sp} = .23*
	At release: r =.18, n.s.; r_{sp} = .21, n.s.
Patients' BSI mean score at admission and release; Sub-scale: Psychoticism (Research question 3.2C)	*At admission: r = .32**; r_{sp} = .29***
	*At release: r = .16, n.s.; r_{sp} = .21**
Patients' BSI mean score at admission and release; Sub-scale: Global severity index (Research question 3.2C	At admission: r = .45***
	At release: r = .21, n.s.
Patients' BSI mean score at admission and release; Sub-scale: Positive symptom distress index (Research question 3.2C)	*At admission: r = .41****
	*At release: r = .28***
Patients' BSI mean score at admission and release; Sub-scale: Positive symptom total (Research question 3.2C)	At admission: r = .40***
	At release: r = .05, n.s.
[1]Patients' PHQ sum scores at admission and release; Sub-scale: Somatoform disorder (Research question 3.2D)	At admission: r = .24*
	For women: r = .18, n.s.
	For men: r = .28, n.s.
	At release: r = 17, n.s.; r_{sp} = .14, n.s.
	For women: r = .15, n.s.; r_{sp} = .11, n.s.
	For men: r = -.03, n.s.; r_{sp} = .07, n.s.
[1]Patients' PHQ sum scores at admission and release; Sub-scale: Depressive disorder (Research question 3.2D)	At admission: r = .36**
	At release: r = .15, n.s.; r_{sp} = .18, n.s.
[1]Patients' PHQ sum scores at admission and release; Sub-scale: Anxiety disorder (Research question 3.2D)	At admission: r = .50***
	At release: r = .19, n.s.; r_{sp} = .25*
[1]Patients' duration of treatment at clinic (Research question 3.2E)	r = .25*; r_{sp} = .33**

Note. Italicized scales and statistical results represent those that reached statistical significance at admission and upon release (the respective p-level is indicated with the asterisks). [1]Coefficients are calculated using the SPS sum score.
*p < .05; **p < .01; ***p < .001.

As can be seen in Table 43, SPS was significantly related to almost all additional clinical variables. Two exceptions were found regarding patients' incapacity for work in the last 12 months and the GAF score, which represents patients' general functioning. The remaining

coefficients revealed mainly small effect sizes. Interestingly, on half of the BSI sub-scales (i.e., six sub-scales), the correlations with SPS became non-significant when considering the data upon release, while those at the time of admission all reached statistical significance. Similar results were found for two of the three PHQ sub-scales: While the coefficients were no longer significant upon release on the sub-scales Somatoform disorder and Depressive disorder, only the non-parametric coefficient reached significance on a level of $p < .05$ on the sub-scale measuring Anxiety disorders. In order to further investigate how exactly the different levels of sensitivity relate to these additional scales, Research question 3.2 investigates differences between the groups.

Summary of Research question 3.1

Research question 3.1 aimed at investigating whether SPS was related to the various additional scales that were available for part of the clinical sample. While no significant relationships were found relating to patients' incapacity for work within the 12 months prior to admission (in weeks) and their scores on the Global Assessment of Functioning (GAF) at admission and release, the remaining correlation analyses reached statistical significance. However, one interesting finding was the fact that on half of the BSI-sub-scales, such as Anxiety or Hostility, the correlation with SPS was no longer significant upon release.

8.2.3.2. Validation of relationships between sensory-processing sensitivity and additional clinical variables through comparisons between sensitivity groups.

Research question 3.2: Based on the significant relationships revealed in research question 3.1, do the three sensitivity groups differ on those variables (i.e., scales common in the psychiatric field and length of stay) as well?

Before conducting the analyses, the data set was investigated again, because additional clinical data were not available for the total clinical sample and availability also differed across variables. The final distribution of groups based on the clinical sample with available additional clinical data was as follows:

- Group 1 (i.e., low sensitive group): $n = 3$ (in the total clinical sample: $n = 7$; i.e., 42.86% of the total sample);
- Group 2 (i.e., medium sensitive group): $n = 35$ (in the total clinical sample: $n = 47$, i.e., 74.47% of the total sample);

- Group 3 (i.e., high sensitive group): $n = 52$ (in the total clinical sample: $n = 76$, i.e., 68.42% of the total sample).

The low sensitive group was specifically lacking additional data. This could be due to the fact that they participated anonymously, but could also be due to the fact that for some patients, despite their consent, data were not made available by the clinic. However, this resulting should be taken into consideration when interpreting the upcoming results. Furthermore, a sample size of $n = 3$ in the first group (i.e., the low sensitive group) is very small, specifically when comparing those to the remaining two groups that include 35 and 52 participants. Therefore, it was decided to combine the low and the medium sensitive group for the upcoming analyses on additional clinical data. The remaining two groups then were the following:

- Group 1 (i.e., low sensitive group): $n = 38$ (i.e., 42.22% of the total sample);
- Group 2 (i.e., high sensitive group): $n = 52$ (i.e., 57.78% of the total sample).

These two groups differed regarding their mean SPS scores ($t(88) = -14.340$, $p < .001$, $d = 0.31$; Mann-Whitney U test: $U = 1976.00$, $p < .001$) and therefore represented a suitable way of differentiating between groups with different levels of sensitivity.

After this preliminary step, the research question was answered using independent-samples t-test or the non-parametric alternative (i.e., the Mann-Whitney-U test). Figures 39 and 40 below graphically depicts the response pattern of both groups across all the variables of interest for this research question. Figure 39 includes mean scores, while Figure 40 includes sum scores. They were separated in order to adjust for the respective reference frame. Whether the two groups differed significantly from each other is represented by parentheses and asterisks. The two PSDI sub-scales (i.e., at admission and upon release) of the BSI scale have also been removed to make clearer comparisons.

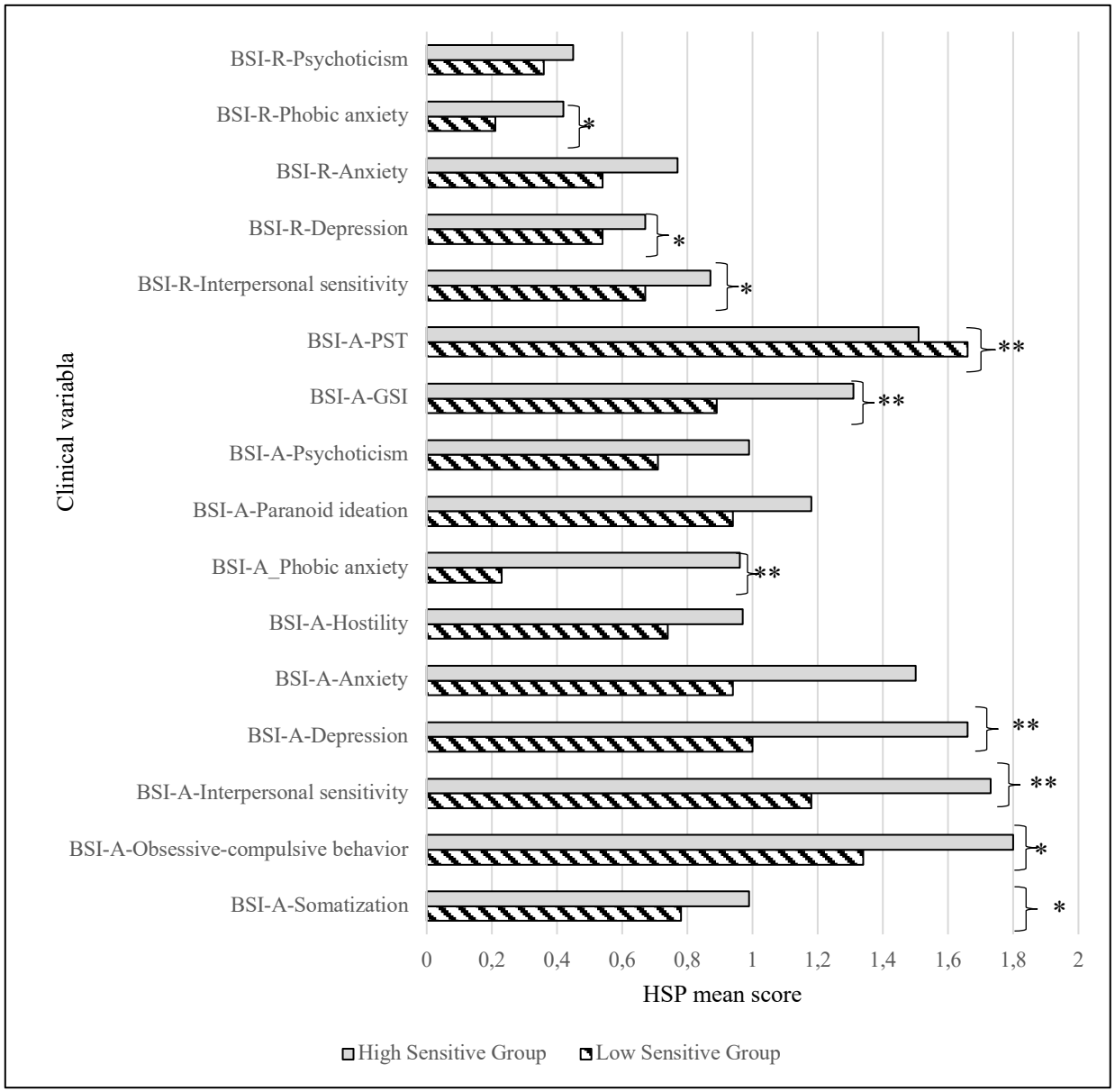

Figure 39. Resulting mean scores across different BSI sub-scales of the high and the low sensitiv group separately. BSI = Brief Symptom Inventory; A = at admission; R = at release; PST = Positive Symptom Total; GSI = Global Severity Index.
**p* < .05. ***p* < .01. ****p* < .001.

As is shown in Figure 39, the two sensitivity groups differed significantly on numerous additional clinical dimensions. Specifically, a significant difference was found on ten out of the 16 measures. Nevertheless, a few scales have been found on which the two groups did not differ significantly. For example, they did not differ on Psychoticism at admission and release, Paranoid ideation (at admission), Hostility (at admission), Anxiety at release and Somatization at admission. However, on the variables on which the two groups differed from each other significantly, all effect sizes ranged between small and intermediate. While the lowest effect

size was found on the sub-scales BSI-R-Depression *(*i.e., R = release), BSI-R-Interpersonal sensitivity, and BSI-R-Phobic anxiety with effect sizes of d = 0.19, d = 0.28 and d = 0.40 respectively, the biggest effect was found on the sub-scale BSI-A-Depression (i.e., d = 0.70; A = admission).

Figure 40 below depicts additional variables that were shown to correlate significantly with SPS, but were not related to the BSI scale.

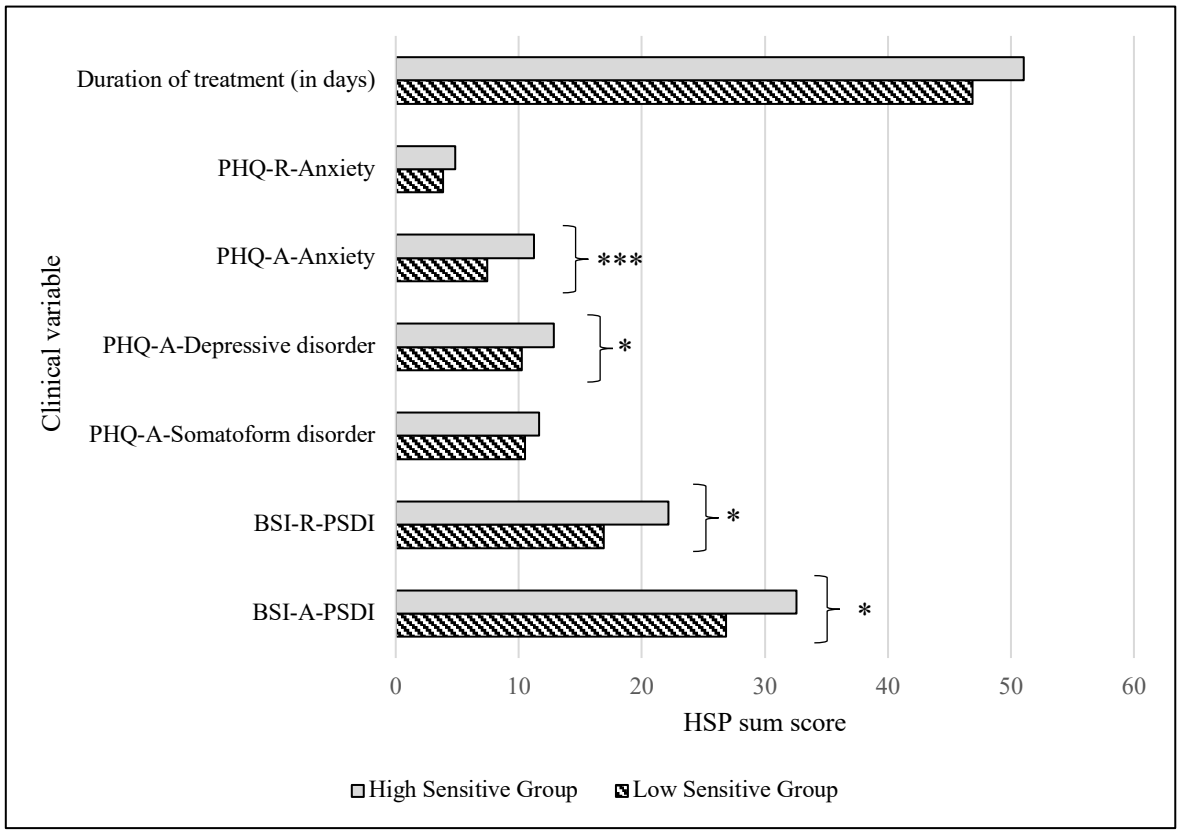

Figure 40. Resulting sum scores on different additional measures of psychological well-being applied in the present study (i.e., duration of treatment, PHQ sub-scales Anxiety and Depressive disorder and the BSI sub-scale PSDI) of the high and the low sensitive group separately. BSI = Brief Symptom Inventory; PHQ = Patient Health Questionnaire; A = at admission; R = at release; PSDI=Positive syndrom distress matrix.
*p < .05. ***p < .001.

Based on the depiction of results in Figure 40 above, the two groups were found to significantly differ on the PSDI sub-scale at admission and release, and on Anxiety as well as Depression at admission. While the largest effect size was found on the sub-scale Anxiety at admission (d = 0.86), the remaining three scores ranged from d = 0.44 to d = 0.54, which is interpreted as small to intermediate.

It is also important to note, that gender could not be controlled for in this analysis, because one requirement for a covariate is that it be measured on a continuous level. Therefore, the difference between the High and the low sensitive group was calculated again for males and females separately. The respective tests also revealed no statistically significant difference between the two sensitivity groups.

Summary of Research question 3.2

After having found tendencies regarding relationships between SPS and additional clinical measurements with the prior research question, this research question further analyzed whether the sensitivity groups also differed on those variables that reached significance in the previous research question. Before conducting the analysis, however, the three sensitivity groups defined in a previous section were investigated in further detail since additional data were not available for the whole clinical sample. Since there were only three participants in the low sensitive group after including those with relevant data, it was decided to create two new groups, one low sensitive group and one high sensitive group, which were comparable in size. The analyses found that the two resulting sensitivity groups did differ significantly on most of the variables, but not on all. Some examples of non-significant results were Psychoticism at admission and upon release as well as Anxiety at release as measured based on the Brief Symptom Inventory and the Patient Health Questionnaire.

8.2.3.3. Sensitivity groups and their difference regarding previous treatment.

Research question 3.3: Does a relationship between sensitivity group and whether patients received outpatient treatment before admission to the clinic exist? How does the result change when only considering psychiatric outpatient treatment?

Out of the 35 participants whose answers to this question (i.e., any outpatient treatment, including psychotherapeutic and psychiatric treatment) were available, n = 3 did not receive treatment before admission to the clinic, while n = 32 did. When further analyzing these numbers in relation with the respective sensitivity group, no relationship was revealed. This was further supported by the non-significant Pearson's chi-square test ($\chi^2(1) = 1.01$, n.s.; Cramers $V = .11$, n.s.).

When considering only the question whether patients in both sensitivity groups received psychiatric treatment before their time of admission, the results were different, and based on a significantly lower number of participants (i.e., the answers of only 16 people on this particular question were available in the present study). In particular, 12 participants did not receive psychiatric treatment, while four patients have had previous experiences with psychiatric outpatient treatment. The chi-square test of independence revealed a non-significant result for this part of the question as well ($\chi^2(1) = 0.90$, n.s.; Cramers $V = .16$, n.s.). Therefore, no relationships were found between the sensitivity group and whether patients have had experienced outpatient treatment (in general and just with regard to psychiatric treatment) before thex were admitted to the clinic.

8.2.3.4. Sensitivity groups and severity of psychological strain (based on the BSI).

Research question 3.4: Is there a relationship between the respective sensitivity group and patients who reached a T-score that was bigger than 63 on any of the BSI sub-scales at admission and/or upon release?

In addition to investigating mean scores and relationships with SPS as well as differences on those scores between the sensitivity groups, a second option was to interpret clinical data based on the severity of symptoms. This, at the same time, represented a pre-step to the upcoming analyses, investigating the relationship between SPS and specific diagnoses.

In the present study, this would be possible for the BSI sub-scales as they also include T-scores at admission and release. By definition, symptoms are noticeable, if T-scores exceed 63. For this research question, the T-scores on the BSI sub-scales were dichotomized (i.e., codes used: 1 = T-score > 63, 0 = T-score ≤ 63) in order to investigate whether a relationship between the number of people with severe symptoms was related to the respective sensitivity group they have been assigned to. Table 44 below includes an overview of the number of participants with T-scores > 63 across sub-scales and the GSI-scale in both sensitivity groups. Furthermore, a statistical measurement in form of the chi-square test of independence was conducted and also added in the table below.

Table 44

Number of Patients in the Low and high sensitive group Assigned to T-Score Groups Across BSI Sub-Scales and Resulting Chi-Square Test of Independence

BSI sub-scale	Low sensitive Group		high sensitive group		Result of χ^2-Test of independence
	T < 63	T > 63	T < 63	T > 63	
At admission	*Data basis: n = 38*		*Data basis: n = 51*		
Somatization	20	18	21	30	χ^2 (1) = 1.15, n.s.; Cramer's *V* = .11, n.s.
Obsessive-compulsive behavior	*15*	*23*	*10*	*41*	*χ^2 (1) = 4.25*; Cramer's V = .22**
Interpersonal sensitivity	18	20	17	34	χ^2 (1) = 1.80, n.s.; Cramer's *V* = .14, n.s.
Depression	*17*	*21*	*11*	*40*	*χ^2 (1) = 5.42*; Cramer's V = .25**
Anxiety	18	20	14	37	χ^2 (1) = 3.75, n.s.; Cramer's *V* = .21, n.s.
Hostility	24	14	23	28	χ^2 (1) = 2.85, n.s.; Cramer's *V* = .18, n.s.
Phobic anxiety	*26*	*12*	*18*	*33*	*χ^2 (1) = 9.56**; Cramer's V = .33***
Paranoid ideation	20	18	24	27	χ^2 (1) =.27, n.s.; Cramer's *V* = .06, n.s.
Psychoticism	20	18	22	29	χ^2 (1) =.79, n.s.; Cramer's *V* = .09, n.s.
Global Severity Index	*12*	*26*	*6*	*45*	*χ^2 (1) = 5.30*; Cramer's V = .24**
At release	*Data basis: n = 37*		*Data basis: n = 51*		
Somatization	26	11	33	18	χ^2 (1) =.30, n.s.; Cramer's *V* = .06, n.s.
Obsessive-compulsive behavior	29	8	36	15	χ^2 (1) =.67, n.s.; Cramer's *V* = .09, n.s.
Interpersonal sensitivity	30	7	32	19	χ^2 (1) = 3.46, n.s.; Cramer's *V* = .20, n.s.
Depression	29	8	34	17	χ^2 (1) = 1.45, n.s.; Cramer's *V* = .13, n.s.
Anxiety	27	10	35	16	χ^2 (1) =.20, n.s.; Cramer's *V* = .05, n.s.
Hostility	33	4	40	11	χ^2 (1) = 1.76, n.s.; Cramer's *V* = .14, n.s.
Phobic anxiety	33	4	38	13	χ^2 (1) = 2.97, n.s.; Cramer's *V* = .18, n.s.
Paranoid ideation	32	5	40	11	χ^2 (1) =.94, n.s.; Cramer's *V* = .10, n.s.
Psychoticism	29	8	35	16	χ^2 (1) = 1.03, n.s.; Cramer's *V* = .11, n.s.
Global Severity Index	*28*	*9*	*28*	*23*	*χ^2 (1) = 4.00*; Cramer's V = .21**

Note. Italicized sub-scales, numbers and statistical results represent those that reached statistical significance.
**p* < .05; ***p* < .01.

As is shown in Table 44, more relationships between sensitivity group and whether patients reach high (i.e., T > 63) or low (i.e., T ≤ 63) T-scores reached statistical significance on the

sub-scales measured at admission, while only the GSI (i.e., Global Severity Index) still revealed a significant relationship between T-score and sensitivity group at release. Sub-scales that revealed evidence for a relationship were Obsessive-compulsive behavior, Anxiety, Phobic anxiety and the Global severity index. In three of the four aforementioned sub-scales, the same tendency was found: In the high sensitive group, relatively more participants reached higher T-scores compared to the distribution in the low sensitive group. One interesting result was found on the sub-scale measuring Phobic anxiety. While a larger percentage of participants in the low sensitive group reached low T-scores, the opposite was true for the high sensitive group. However, all effect sizes reached values between .21 and .33 and therefore indicated weak relationships.

8.2.3.5. Sensitivity groups and patients' main and secondary diagnoses.

Research question 3.5: How do the respective sensitivity groups relate to different main and secondary diagnoses?

Since the main and secondary diagnoses varied significantly regarding their number (i.e., per person and overall) and specification, this research question was the only one in the present study that was answered based on descriptive data, if only partially.

In order to answer, a table (Table D, see Appendix D) was created which lists all main and secondary diagnoses and the respective number of patients within each sensitivity group. It is important to note that while only one main diagnosis was given to each of the participants, up to 11 secondary diagnoses were found across individual participants. For simplicity and conciseness, the number reported in the table represents the sum of participants with any of the particular secondary diagnosis, regardless of whether it was "first" secondary or the "ninth" secondary diagnosis. These circumstances ruled out the possibility to do further analyses besides exploring the link between sensitivity group and main diagnosis. Therefore, Research question 3.5B was therefore answered based on descriptive data only.

Based on this table, which gives a general insight into how often certain diagnoses were given as main or secondary diagnoses, a slight pattern became clear. This pattern will be described in more detail separately baed on the following two more specific research questions, questions 3.5A and 3.5B.

Research question 3.5A: How do the respective sensitivity groups relate to different main diagnoses?

In general, of the 76 patients assigned to the high sensitive group and the 54 patients originally assigned to the low sensitive group in the clinical sample, data for the main diagnosis were not available for 26 and 16 participants, respectively, resulting in final sample sizes of $n = 50$ (high sensitive group) and $n = 38$ (low sensitive group) for this part of the question. In order to make those unequal numbers comparable, percentages will also be reported.

Firstly, the most common main diagnosis across both groups were F33.1 (i.e., 36.36% of all patients), F32.1 (i.e., 26.14% of all patients) and F33.2 (i.e., 15.91% of all patients). All three diagnoses describe a depressive disorder, while two of them represent a recurring depressive disorder, with an either severe (F33.2) or moderate (F33.1) intensity. The third diagnosis was a moderate depressive episode (without repeated episodes). When differentiating between these two sensitivity groups, a different picture arose.

While the ICD-10 codes F32.1 (high sensitive group: $n = 12$ patients, i.e., 24%; low sensitive group: $n = 11$ patients, i.e., 28.95%) and F33.1 (high and low sensitive group: $n = 16$ patients, i.e., 32% for the high and 42.11% for the low sensitive group) were distributed relatively similarly across the two groups, some differences were found as well. Specifically, there were significant differences regarding diagnosis F32.2 (i.e., severe depressive episode without psychotic symptoms), which was only found with patients in the high sensitive group ($n = 6$, i.e., 12%), and F33.2 (i.e., recurring depressive disorder with a severe episode without psychotic symptoms), which was found for three patients (i.e., 7.89%) in the low sensitive group, but for 11 (i.e., 22%) in the high sensitive group. Furthermore, regarding the more scarce main diagnoses, patients in the high sensitive group were found to be more in the range of diagnoses F40.01 to F41.0 (i.e., phobic and anxiety disorders), while patients assigned to the low sensitive group were more likely to have diagnoses F42.1 to F50.9 (i.e., including for example obsessive-compulsive disorders, posttraumatic stress disorder, somatization and eating disorders). However, despite slight differences found based on the descriptive statistics, a statistical analysis could not support a relationship between sensitivity group and main diagnosis ($\chi^2(16) = 19.13$, n.s.; Cramers $V = .38$, n.s.). However, it is important to note that the assumption of having "expected frequencies … greater than 5" (Field, 2009, p. 692) was not met and, thus, the results have to be interpreted with caution.

Research question 3.5B: How do the respective sensitivity groups relate to different secondary diagnoses?

Like the situation with Research question 3.5A, secondary diagnoses were not available for all participants in the clinical sample. Rather, the final number of participants for whom at least one secondary diagnosis was available was $n = 33$ in the low sensitive group and $n = 47$ in the high sensitive group. The three most common secondary diagnoses and the respective number of patients with this diagnosis (or these diagnoses) were the following:

- I10.90 (i.e., hypertension): In total, this diagnosis was mentioned 15 times, six times in the low sensitive group (i.e., 45%) and nine (i.e., 19.15%) times in the high sensitive group;
- H93.10 (i.e., tinnitus): A total of 13 patients had this diagnosis as a secondary diagnosis, out of which 12 (25.53%) were also assigned to the high sensitive group;
- F45.8 (i.e., somatoform disorders): Although this diagnosis was found for seven patients as well, the distribution was different than in the diagnosis before. In particular, six people were assigned to the high sensitive group (i.e., 12.77%), while only one was assigned to the low sensitive group (i.e., 3.03%).

While preliminary differences between the two groups were previously found in the list above, such as the uneven distribution of people diagnosed with tinnitus (H93.10) and somatoform disorders (F45.8) between the two groups (i.e., with patients in the high sensitive group having this diagnoses more often than patients in the low sensitive group regarding both diagnoses), more subtle differences were found as well. For example, patients assigned to the high sensitive group were found to be diagnosed more often with codes M, which includes disorders of the musculoskeletal system and the connective tissue, and more codes starting with Z50 to Z90, which include different kinds of need for care, such as the social situation or self-diagnosed social or behavioral problems. However, the differences found were not as significant as the ones found with regard to the main diagnosis and therefore have to be interpreted with caution.

Summary of Research question 3.5

Patients were most commonly diagnosed with depression as a main diagnosis, which together with phobic and general anxiety, was also found in a relatively high number of patients in the high sensitive group. Patients in the low sensitive group were diagnosed with other disorders, including obsessive-compulsive or posttraumatic stress disorders. However, a relationship between both variables was not supported by statistical analyses.

Regarding secondary diagnoses in the clinical sample, smaller differences were found. The most common secondary diagnoses were hypertension, tinnitus and somatoform disorders, which is not surprising given that the study was conducted in a psychosomatic clinic. Somatoform disorders and tinnitus were specifically more common in the high sensitive group than the low sensitive group.

8.2.3.6. Sensory-processing sensitivity and therapeutic success (based on the theory of vantage sensitivity).

Research question 3.6: How does SPS relate to therapy success and progress in the clinical sample (i.e., in line with the vantage sensitivity theory)?

Four variables were available in the present data set that was specifically developed to measure change (or success) in a therapeutic process: The difference between the BDI-II at admission and release, the GSI score as part of the Brief Symptom Inventory, the scores of the PHQ sub-scales as well as the GAF scores two months before admission and upon release. Further, the differences in T-scores on all BSI sub-scales were applied to measure changes in particular symptoms. One important aspect to consider regarding this analysis was the participants' lengths of stay which would likely influence the existence and degree of therapeutic change. Therefore, all upcoming analyses were conducted first without and subsequently with controlling for the length of the stay at the clinic. Based on the theory of vantage sensitivity (see chapter 3.9.3.), all upcoming hypotheses expect that SPS is positively related with patients' improvement in the psychotherapeutic (or in this case psychosomatic) process. Using the two analytic methods applied from previous research questions (i.e., correlation analyses and the comparison of mean scores), the hypotheses as part of Research question 3.6 were the following.

Hypothesis 3.6A: SPS is significantly positively related to the difference in BDI-II scores between admission and release.

Hypothesis 3.6B: SPS is significantly positively related to the difference in GAF scores two months before admission and upon release.

Hypothesis 3.6C: SPS is significantly positively related to the difference in BSI-GSI scores between admission and release.

Hypothesis 3.6D: SPS is significantly positively related to the difference in T-scores on the BSI sub-scales between admission and release.

Hypothesis 3.6E: SPS is significantly positively related to the difference in sum scores on the PHQ sub-scales between admission and release.

As the statistical approach to answering the first five hypotheses was similar, those are answered together. Table 45 below summarizes the correlation coefficients revealed.

Table 45

Summary of Correlation Coefficients for Associations between HSP Sum Scores and Measures of Decreased Psychological Well-Being (i.e., BDI-II scores, GAF scores, scores on different BSI sub-scales, and scores on different PHQ sub-scales) With and Without Controlling for Length of Stay

Variable correlated with SPS, sub-scale and research question	Result without controlling for length of stay	When controlling for length of stay (in days)
Difference in BDI-II scores *(Research question 3.7A)*	r = .23, n.s.	r_p = .20, n.s.
Difference in GAF scores *(Research question 3.7B)*	r = -.10, n.s.	r_p = -.11, n.s.
Difference in BSI-GSI scores *(Research question 3.7C)*	r = 0.12, n.s.	r_p = .12, n.s.
Difference in patients' BSI T-score Sub-scale: Somatization *(Research question 3.7D)*	r = .16, n.s.	r_p = .17, n.s.
Difference in patients' BSI T-score Sub-scale: Obsessive-compulsive behavior (Research question 3.7D)	*r = .26, $p < .05$*	*r_p = .30, $p < .05$*
Difference in patients' BSI T-score Sub-scale: Interpersonal sensitivity *(Research question 3.7D)*	r = .05, n.s.	r_p = .18, n.s.
Difference in patients' BSI T-score Sub-scale: Depression *(Research question 3.7D)*	r = .06, n.s.	r_p = .13, n.s.
Difference in patients' BSI T-score Sub-scale: Anxiety *(Research question 3.7D)*	r =. 18, n.s.	r_p = .22, n.s.

(continued)

Variable correlated with SPS, sub-scale and research question	Result without controlling for length of stay	When controlling for length of stay (in days)
Difference in patients' BSI T-score Sub-scale: Hostility *(Research question 3.7D)*	r = .15, n.s.	r_p = .20, n.s.
Difference in patients' BSI T-score Sub-scale: Phobic anxiety (Research question 3.7D)	*r = .25, p < .05*	*r_p = .43, p < .01*
Difference in patients' BSI T-score Sub-scale: Paranoid ideation *(Research question 3.7D)*	r = .05, n.s.	r_p = .16. n.s.
Difference in patients' BSI T-score Sub-scale: Psychoticism *(Research question 3.7D)*	r =. 11, n.s.	r_p = .20, n.s.
Difference in patients' PHQ sum scores Sub-scale: somatoform disorder *(Research question 3.7E)*	r = .11, n.s. For women: r = .03, n.s. For men: r = .38, n.s.	r_p = .16, n.s. For women: r_p = .04, n.s. For men: r_p = .20, n-s.
Difference in patients' PHQ sum scores Sub-scale: Depressive disorder (Research question 3.7E)	*r = .25, p < .05*	*r_p = .22, n.s.*
Difference in patients' PHQ sum scores Sub-Scale: Anxiety (Research question 3.7E)	*r = .40, p < .001*	*r_p = .35, p < .05*

Note. For part of research question 3.7E, the correlations were calculated for female and male separately due to previous preliminary findings suggesting gender to be a possible confounding variable.
r_p = partial correlation (in this case controlling for length of stay measured in days).
*Difference was calculated by subtracting the GAF-score two months before admission from the GAF-score at release; positive scores therefore indicate an improvement, while negative scores indicate a decrease in patients' functioning level.

Research question 3.6F: Can these findings revealed in hypothesis 3.6A to 3.6E be further supported when comparing the sensitivity groups as well?

For three of the four correlations that reached statistical significance (i.e., BSI sub-scale Obsessive-compulsive behavior, Phobic anxiety, PHQ sub-scale Depressive disorder; see italicized results in Table 45 above), no significant differences between the sensitivity groups were found. However, the comparison of sensitivity groups on the PHQ sub-scale anxiety reached a statistically significant result ($t(85) = -3.33$, $p < .01$, $d = 0.72$).

Research question 3.6G: Is there a relationship between CGI Improvement scores and membership in a sensitivity group?

This research question was answered using the Pearson's chi-square test of independence based on the membership in a certain sensitivity group and the respective CGI Improvement scores,

ranging from 1 (*very much improved*) to 7 (*very much worse*). Results revealed a non-significant chi-square score of 3.61 (*df* = 3) that did not support a relationship between the two variables of SPS and CGI Improvement score.

Research question 3.6H: Is there a relationship between sensitivity group membership and the group of participants with high severity on the BSI sub-scales (as defined by T-scores of > 63) at admission, but managed to stay below this threshold at release?

In order to answer this research question, which represents another, more general way of looking at the data from a vantage sensitivity point of view, the dichotomized scores created for Research question 3.4 were applied. The two dichotomized scores for each BSI sub-scale (i.e., one at admission and one at release) were compared and a third variable was created for each sub-scale. This was done by comparing the code (i.e., based on the respective T-scores) at admission and the score at release and subsequently evaluating this difference. In this case, the following evaluation codes were created:

- 0 = no difference between the dichotomous code at admission and release (i.e., the dichotomous T-score was the same at admission and upon release, which could be either 0 or 1);
- 1 = Improvement (i.e., the dichotomous T-score was 1 at admission and 0 upon release);
- 2 = Change for the worse (i.e., the dichotomous T-score was 0 at admission and 1 upon release).

In a second step, a preliminary overview is given based on the descriptive data and subsequently the chi-square test was conducted in order to investigate the relationship. Table 46 below summarizes all results.

On most BSI sub-scales, most participants with available data on these scales did not change significantly (i.e., meaning changing from above the threshold of 63 to below this threshold), but rather did not reveal any change. Only on Obsessive-compulsive behavior sub-scale in the high sensitive group, a slight majority improved (i.e., 54.00%) compared to the number of participants for whom no change was found (i.e., 44.00%). Furthermore, across sub-scales, a decrease in well-being was only found for a small minority of participants, which ranged from 2.00% to 10.81%. This percentage was lower in the high sensitive group (i.e., 2.00%-4.00%) than in the low sensitive group (i.e., 2.70%-10.81%).

Additionally, in seven of the nine BSI sub-scales, the percentage of participants who improved, was higher in the high sensitive group compared to the low sensitive group. The only two exceptions were found in the sub-scales Interpersonal sensitivity and Paranoid ideation. However, in participants without any change, this was only true for the three sub-scales Somatization, Interpersonal sensitivity, and Paranoid ideation. On the remaining sub-scales, these percentages were higher in the low sensitive group. However, as was the case in previous results, these differences were small and did not reach a significant chi-square score, which would indicate a relationship between sensitivity group membership and whether patients improved, declined, or did not show any significant change.

Table 46

Number and Proportion of Patients of the Low and high sensitive group Assigned to Groups of Therapy Success Across BSI Sub-Scales

BSI sub-scale	low sensitive group ($N = 37$)			high sensitive group ($N = 50$)			Test of independence (χ^2)
	Improved	Without change	Declined	Improved	Without change	Declined	
Somatization	10 (27.03%)	24 (64.86%)	3 (8.11%)	14 (28.00%)	34 (68.00%)	2 (4.00%)	$\chi^2(2) = .66$ Cramer's $V = .09$
Obsessive-compulsive behavior	16 (43.24%)	19 (51.35%)	2 (5.41%)	27 (54.00%)	22 (44.00%)	1 (2.00%)	$\chi^2(2) = 1.46$ Cramer's $V = .13$
Interpersonal sensitivity	14 (37.84%)	21 (56.76%)	2 (5.41%)	17 (34.00%)	31 (62.00%)	2 (4.00%)	$\chi^2(2) = .28$ Cramer's $V = .06$
Depression	14 (37.84%)	21 (56.76%)	2 (5.41%)	23 (46.00%)	26 (52.00%)	1 (2.00%)	$\chi^2(2) = 1.14$ Cramer's $V = .11$
Anxiety	13 (35.14%)	20 (54.05%)	4 (10.81%)	22 (44.00%)	27 (54.00%)	1 (2.00%)	$\chi^2(2) = 3.29$ Cramer's $V = .19$
Hostility	9 (24.32%)	28 (75.68%)	0	19 (38.00%)	29 (58.00%)	2 (4.00%)	$\chi^2(2) = 3.73$ Cramer's $V = .21$
Phobic anxiety	7 (18.92%)	30 (81.08%)	0	20 (40.00%)	29 (58.00%)	1 (2.00%)	$\chi^2(2) = 5.46$ Cramer's $V = .25$
Paranoid ideation	15 (40.54%)	20 (54.05%)	2 (5.41%)	17 (34.00%)	32 (64.00%)	1 (2.00%)	$\chi^2(2) = 1.31$ Cramer's $V = .12$
Psychoticism	10 (27.03%)	26 (70.27%)	1 (2.70%)	14 (28.00%)	35 (70.00%)	1 (2.00%)	$\chi^2(2) = .05$ Cramer's $V = .03$

Note. Percentage is based on the number of participants for whom data were available which differed across sub-scales. None of the coefficients reported above reached statistical significance.

Research question 3.6I: Is there a relationship between sensitivity group membership and positive GAF difference scores?

This research question was answered similarly to the one above, applying the Pearson's chi-square test. The basis for this analysis was the dichotomized difference between the GAF score at admission and upon release as described in a previous section (see Research question 3.6H). As stated, a code 1 represents a positive difference (i.e., an improvement), while a 2 indicates a negative score, representing a decline in patients' level of functioning (as measured with the GAF score). The results were as follows:

- In the low sensitive group, 32 patients (i.e., 91.40%) achieved a positive score, while the GAF difference score was negative for three patients (i.e., 8.60%).
- Similar results were found in the high sensitive group, in which 92 % (n = 46) patients had a positive difference score, while four (i.e., 8%) had a negative one.

These similarities were also reflected in the non-significant chi-square test (χ^2 = .01, Cramer's V = .01, n.s.), which indicated that no relationship between sensitivity group and the dichotomized GAF difference score existed.

Research question 3.6J: Considering only patients with high severity on the BSI sub-scales (as defined by a T-score above 63) with a significant correlation with SPS, do the sensitivity groups differ with regard to the difference scores?

Because previous analyses considered a more general approach by using the total sample, this research question aimed at analyzing only those patients who revealed a relatively high severity on the respective scales at admission. Based on previous results finding associations between SPS and certain clinical variables as well as the difference scores of those variables, the variables of Obsessive-compulsive behavior, Phobic anxiety and Depression were of interest in this research question (all measured using the BSI sub-scales). Furthermore, all analyses were conducted twice - first, considering the two sensitivity groups based on scores of the non-clinical sample, and second, considering the two newly developed sensitivity groups based on the data and distribution of SPS in the clinical sample. The results of both steps revealed the following:

- When considering participants with severe problems with Obsessive compulsive behavior, the two sensitivity groups did not differ significantly from each other on their difference scores on this particular scale (U = 511.50, n.s.; t(33,66) = -0.75, n.s.), despite a weak

indication for participants in the high sensitive group reaching higher scores on the scale representing the difference (M = 15.00, SD = 0.89) than patients in the low sensitive group (M = 12.82, SD = 11.94). The same was true when considering the newly developed three sensitivity groups based on the clinical sample (H(2) = 4.73, n.s.; F(2,60) = 2-15, n.s.). Nevertheless, the high sensitive group tended to have higher difference scores (M = 17.00, SD = 8.92) than the medium (M = 11.14, SD = 10.98) and the low sensitive group (M = 13.60, SD = 9.63).

- Looking at the scale measuring Phobic anxiety, a similar result was found: Both sensitivity groups did not differ significantly from each other (t(41) = -0.02, n.s.; U = 161.00, n.s.) when considering the sensitivity groups based on the non-clinical sample. Contrary to the scale above, no tendency regarding the difference scores of the low sensitive group (M = 13.09, SD = 12.17) and the high sensitive group (M = 13.16, SD = 10.56) existed. The same was found when considering the newly developed sensitivity groups (H(2) = 0.15, n.s. F(2,40) = 0.01, n.s.; $M_{\text{High Sensitive}}$ = 12.46, $SD_{\text{High Sensitive}}$ = 5.57; $M_{\text{Medium Sensitive}}$ = 12.81, $SD_{\text{Medium Sensitive}}$ = 12.39; $M_{\text{Low Sensitive}}$ = 13.60, $SD_{\text{Low Sensitive}}$ = 12.46).
- Finally, the BSI sub-scale measuring Depression was considered and possible differences across groups were analyzed. Similarly, when considering the sensitivity groups based on the non-clinical sample (t(57) = -0.46, n.s. $M_{\text{Low Sensitive}}$ = 12.70, $SD_{\text{Low Sensitive}}$ = 11.75; $M_{\text{High Sensitive}}$ = 13.97, $SD_{\text{High Sensitive}}$ = 8.97) and the newly developed three sensitivity groups (F(2,56) = 0.17, n.s.), no statistical difference was found. Nevertheless, a tendency in the same direction as before was found with the high sensitive group (M = 14.32, SD = 9.35) higher higher scores on average than the medium (M = 13.32, SD = 9.38) and the low sensitive groups (M = 12.33, SD = 12.51).

It is important to note that no non-parametric statistical tests could be computed for the last scale measuring Depression. Furthermore, the sensitivity groups were relatively small (i.e., mainly due to the small number of patients for whom additional data was available) and differed significantly in size, which makes the generalization and interpretation of results more difficult.

Summary of Research question 3.6

This research question aimed at investigating whether SPS was related to patients' improvement during the therapeutic process, as suggested by the vantage sensitivity theory. While correlation coefficients indicated a significant relationship between SPS and the difference scores on the PHQ sub-scale Anxiety as well as the improvement score of the BSI sub-scales Phobic anxiety and Obsessive-compulsive behavior, this was not supported when comparing the two sensitivity groups on these scores. Furthermore, the CGI Improvement score and the sensitivity groups were not related. Similarly, when looking at a dichotomous coding of improvement on the BSI sub-scales (i.e., patients whose T-scores went down from a T-score of at least 63 at admission to below 63 upon release) and its relationship with a respective sensitivity group, no significant relationship was found. Finally, a similar result was found regarding the dichotomized GAF difference scores (i.e., patients whose GAF score increased during the treatment at the clinic, indicating an improvement with regard to patients' level of functioning) and the two sensitivity groups. Finally, only patients with severe impairments on the three most important scales with regarding SPS (i.e., Obsessive-compulsive behavior, Phobic anxiety and Depression) were considered and differences between sensitivity groups (i.e., based on the scores of the non-clinical sample and on the newly developed sensitivity groups based on the clinical sample) were analyzed with regard to their improvement on these particular scales. However, despite an observable tendency suggesting that patients in the high sensitive group had higher difference scores on average than patients in the other two groups, these differences were not statistically significant. In summary, these data provided only preliminary slight support for the theory of vantage sensitivitythat states that HSPs benefit more from therapeutic and psychosomatic interventions.

8.2.3.7. Investigation of therapeutic success based on sensitivity groups revealed on the basis of the clinical sample.

Research question 3.7: Can the theory of vantage sensitivity be supported by present data if the sensitivity groups are created in line with the theoretical distribution with 30% in the low sensitive group, 40% in the medium sensitive group and 30% in the high sensitive group as suggested by Pluess and colleagues (2018)?

Because the three sensitivity groups analyzed in the research question above were assigned based on measures of the non-clinical data set, it was of interest as well whether the vantage

sensitivity framework could be supported more if the sensitivity groups were created based on the clinical sample instead. This research questions analyzed as part of Research question 3.6 were investigated again (based on the newly developed sensitivity groups), following the upcoming specific research questions.

Research question 3.7A: Do the newly created three sensitivity groups differ significantly regarding the difference between the BDI-II scores at admission and upon release?

Research question 3.7B: Do the newly created three sensitivity groups differ significantly regarding the difference between the GAF scores at admission and upon release?

Research question 3.7C: Do the newly created three sensitivity groups differ significantly regarding the differences in BSI T-scores at admission and upon release across all nine sub-scales and the GSI sub-scale?

Research question 3.7D: Do the newly created three sensitivity groups differ significantly regarding the differences in PHQ sum scores at admission and upon release across all three sub-scales?

Since all four specific research questions described above include comparison of scores across the three sensitivity groups, they were answered together. However, as a first step, the three sensitivity groups were calculated based on the distribution of SPS mean scores. This resulted in the following three groups:

- the low sensitive group consisted of 39 patients (i.e., 30% of the clinical sample), who revealed a SPS mean score smaller than or equal to 3.42.
- In addition, 52 patients (i.e., 40% of the clinical sample) revealed SPS mean scores between 3.43 and 4.17 and were therefore assigned to the medium sensitive group.
- Finally, the high sensitive group consists of n = 39 patients (i.e., 30% of the clinical sample), who all reached SPS mean scores above 4.17.

The three sensitivity groups differed significantly on the overall mean scores on the HSP scale and the individual items on a level of $p < .001$.

Table 47 depicts the results of Research questions 3.7A to 3.7D.

Table 47

Summary of Results of Mean Differences Between Sensitivity Groups on Difference PHQ Sum Scores (i.e., Between Admission and Release)

Variable and research question	Results of statistical test
Difference in BDI-II scores *(Research question 3.7A)*	$F(2,47) = 1.46$, n.s.
Difference in GAF scores *(Research question 3.7B)*	$F(2,82) = 1.60$, n.s. $^{2}\chi^{2} = 2.45$, n.s.
Difference in BSI-GSI scores *(Research question 3.7C)*	$F(2,84) = 1.23$, n.s. $^{2}\chi^{2}(2) = .79$, n.s.
Difference in patients' BSI T-score Sub-scale: Somatization *(Research question 3.7C)*	$F(2,84) = 0.69$, n.s.
Difference in patients' BSI T-score Sub-scale: Obsessive-compulsive behavior *(Research question 3.7C)*	$F(2,84) = 4.16$, n.s.
Difference in patients' BSI T-score Sub-scale: Interpersonal sensitivity *(Research question 3.7C)*	$F(2,84) = 0.27$, n.s.
Difference in patients' BSI T-score Sub-scale: Depression *(Research question 3.7C)*	$F(2,84) = 0.43$, n.s.
Difference in patients' BSI T-score Sub-scale: Anxiety *(Research question 3.7C)*	$F(2,84) = 0.82$, n.s.
Difference in patients' BSI T-score Sub-scale: Hostility *(Research question 3.7C)*	$F(2,84) = 2.34$, n.s.
Difference in patients' BSI T-score Sub-scale: Phobic anxiety *(Research question 3.7C)*	$^{1}F(2,84) = 3.11$, n.s.
Difference in patients' BSI T-score Sub-scale: Paranoid ideation *(Research question 3.7C)*	$F(2,84) = 2.43$, n.s.
Difference in patients' BSI T-score Sub-scale: Psychoticism *(Research question 3.7C)*	$F(2,84) = 0.8$, n.s.
Difference in patients' PHQ sum scores Sub-scale: Somatoform disorder *(Research question 3.7D)*	$F(2,82) = 0.71$, n.s. $^{2}\chi^{2}(2) = 2.17$, n.s. For women: $F(2,60) = 1.17$, n.s. $^{2}\chi^{2}(2) = 2.99$, n.s. For men: $F(2,21) = 1.67$, n.s. $^{2}\chi^{2}(2) = 3.40$, n.s.
Difference in patients' PHQ sum scores Sub-scale: Depressive disorder *(Research question 3.7D)*	$F(2,84) = 2.56$, n.s.
Difference in patients' PHQ sum scores Sub-Scale: Anxiety (Research question 3.7D)	*$F(2,84) = 7.29$, $p < .01$* *$d = 0.84$*

Note. Italicized variables and statistical results represent those that reached statistical significance. Part of research question 3.7D (i.e., on PHQ sum scores on the sub-scale Somatoform disorder) were analyzed separately for men and women as gender might be a confounding variable.

[1]A One-way ANOVA was marginally significant with a p-value of .05; [2] An Kruskal-Wallis test applied as the assumption of normality was not met.

As is shown in Table 47, the only significant difference was found regarding the PHQ sub-scale Anxiety. In particular, the low sensitive group (M = 2.92, SD = 4.34) and the high sensitive group (M = 7.17, SD = 4.09) differed significantly from each other ($p < .01$) as indicated based on the respective post-hoc test. The effect sizes indicated a large effect with participants assigned to the high sensitive group having higher difference scores on average.

Further, ANCOVAs were conducted to control for length of stay. In addition to a significant result revealed for the difference with regard to the PHQ sum scores on the sub-scale Anxiety ($F(2,83) = 7.17$, $p < .01$, $r^2 = .06$; $M_{\text{Low Sensitive}} = 2.92$, $SD_{\text{Low Sensitive}} = 4.34$; $M_{\text{Medium Sensitive}} = 5.06$, $SD_{\text{Medium Sensitive}} = 4.05$; $M_{\text{High Sensitive}} = 7.17$, $SD_{\text{High Sensitive}} = 4.09$), two additional results reached significance.

Those were as follows:

- The difference in patients' BSI T-scores on the sub-scale Obsessive-compulsive behavior ($F(2,83) = 3.67$, $p < .05$, $r^2 = .04$; $M_{\text{Low Sensitive}} = 9.38$, $SD_{\text{Low Sensitive}} = 9.64$; $M_{\text{Medium Sensitive}} = 9.29$, $SD_{\text{Medium Sensitive}} = 11.67$; $M_{\text{High Sensitive}} = 16.07$, $SD_{\text{High Sensitive}} = 9.46$), and
- the difference in patients' BSI T-scores on the sub-scale Phobic anxiety ($F(2,83) = 3.35$, $p < .05$, $r^2 = .05$; $M_{\text{Low Sensitive}} = 4.23$, $SD_{\text{Low Sensitive}} = 8.98$; $M_{\text{Medium Sensitive}} = 8.58$, $SD_{\text{Medium Sensitive}} = 11.59$; $M_{\text{High Sensitive}} = 10.97$, $SD_{\text{High Sensitive}} = 9.54$).

However, these results should be interpreted with caution, as some of the assumptions for ANCOVA (e.g., linear relationship between the covariate and the dependent variable at each level of the independent variable) were not met.

Research question 3.7E: Is there a relationship between CGI Improvement scores and membership in a sensitivity group?

Pearson's chi-square test calculated in order to answer this research question revealed a non-significant result ($\chi^2(6) = 5.01$, Cramer's $V = .18$, n.s.) and could therefore not support a relationship between sensitivity group and the CGI Improvement scores.

Research question 3.7F: Is there a relationship between the dichotomized BSI improvement score across all sub-scales and membership in a sensitivity group?

Like the approach used in Research question 3.7E, a test of independence was applied for answering this research question. The results for all sub-scales were the following:

- Somatization: $\chi^2(4) = .5.61$, n.s., Cramer's $V = .18$, n.s.,
- Obsessive-compulsive behavior: $\chi^2(4) = 6.98$, n.s., Cramer's $V = .20$, n.s.,
- Interpersonal sensitivity: $\chi^2(4) = .57$, n.s., Cramer's $V = .06$, n.s.,
- Depression: $\chi^2(4) = 3.34$, n.s., Cramer's $V = .13$, n.s.,
- Anxiety: $\chi^2(4) = 3.64$, n.s, Cramer's $V = .15$, n.s.,
- Hostility: $\chi^2(4) = 7.85$, n.s., Cramer's $V = .21$, n.s.,
- Phobic anxiety: $\chi^2(4) = 9.98$, $p < .05$, Cramer's $V = .24$, $p < .05$ (pairwise comparisons were significant for the difference between the low and the high sensitive group on a level of $p < .05$; descriptive statistics for the low sensitive group: 88.50% with no change, 11.50% with improvement; descriptive statistics for the medium sensitive group: 64.50% without any changes, 32.30% with an improvement and 3.20% with a decrease in well-being; descriptive statistics for the high sensitive group: 53.30 without changes, 46.70% with improvement),
- Paranoid ideation: $\chi^2(4) = 3.97$, n.s., Cramer's $V = .15$, n.s., and
- Psychoticism: $\chi^2(4) = 3.04$, n.s., Cramer's $V = .13$, n.s..

These results show that a relationship was only found on the sub-scale Phobic anxiety. Specifically, a higher percentage of patients in the high sensitive group showed an improvement compared to those in the low sensitive group.

Research question 3.7G: Is there a relationship between the dichotomized GAF improvement score (between admission) and release and membership in a sensitivity group?

Patients' improvement scores on general functioning was not significantly related to membership to a specific sensitivity group ($\chi^2(2) = 2.29$, n.s., Cramer's $V = .16$, n.s.).

Summary of Research question 3.7

In line with this research question, it was tested whether the results revealed above (as part of Research question 3.6) would change, if the sensitivity groups would be developed solely based on the clinical sample (and not, as it was the case before, when cut-off-scores of the non-clinical sample would be transferred to the clinical sample). Results revealed three groups: 39 patients (i.e., 40%) were assigned to the low sensitive group, 52 (i.e., 40%) to the medium sensitive group and another 39 (i.e., 40%) to the high sensitive group. While the original sensitivity groups (i.e., based on statistics of the non-clinical sample) did not reveal any significant results regarding group differences on variables measuring improvement in psychological well-being, this was different when conducting the analyses using the newly developed sensitivity groups. Specifically, the low and the high sensitive group differed significantly on their improvement on the PHQ sub-scale Anxiety and the BSI sub-scales Obsessive-compulsive behavior and Phobic anxiety (i.e., with duration of stay controlled for). When investigating the differences of the BSI sub-scales, this difference was supported for Phobic anxiety. While all results generally supported the theory of vantage sensitivity and suggested that patients in the new high sensitive group (i.e., defined newly based on the clinical sample) improved more as a result of the psychosomatic treatment in the clinic. However, only a few analyses resulted in significant coefficients, indicating that the restructuring of the sensitivity groups made only a slight difference.

8.2.4. Part 4: Final analyses considering both samples.

This final section takes both samples into consideration. In the first part,
findings revealed in the previous chapters are expanded through the inclusion of factors that are assumed to influence the onset of mental illnesses (i.e., dysfunctional cognitions and coping strategies). Subsequently, both samples are compared to each other regarding the respective sensitivity groups and considering negative affect. Third, the two high sensitive groups (i.e., derived from both the non-clinical and clinical sample) are taken together and analyzed regarding the question of whether different sensitivity types can be extracted. If so, this could explain more about the perception of certain work place characteristics or the application of certain coping strategies. In the fourth and final step, it is investigated what role SPS plays in the onset of psychological ill-health when taking other variables into account.

PART 1 – Extending previous findings by including possible mediating factors

In the two upcoming research questions, the associations between SPS and dysfunctional cognitions as well as coping strategies are investigated. Following the process applied in previous sections, this was accomplished by analyzing the correlations between the respective variables first and, then comparing them across the different sensitivity groups.

8.2.4.1. Sensory-processing sensitivity and dysfunctional cognitions.

Research question 4.1.: Can significant relationships between SPS and the different dysfunctional cognitions be found in each sample?

The relationships reported in the upcoming section are based on basic correlation analyses (= r) or Spearman correlation analyses (= r_{sp}), depending on whether the assumptions (that of a normal distribution) for a basic correlation analysis were met. In cases in which Spearman correlation coefficients are reported, Pearson results are also reported for the sake of completeness. In the present data set, SPS followed a normal distribution and therefore did not have to be checked again in line with these analyses.

Research question 4.1A: Is SPS significantly related to the dysfunctional cognition Dependency in each sample?

The correlation coefficient revealed a significant result (r = .19) on a level of p < .05, showing a relationship that was not hypothesized in the present study.

In the clinical sample, however, SPS was not significantly related to Dependency (r_{sp} = 0.14, n.s.; r = 0.15, n.s.).

Research question 4.1B: Is SPS significantly related to the dysfunctional cognition Perfectionism in each sample?

The hypothesized positive relationship between SPS and perfectionism was not supported in the present study. This was true for the non-clinical (r = .08, n.s.) and the clinical data set (r = -.03, n.s.; r_{Sp} = -.04, n.s.).

Research question 4.1C: Is SPS significantly related to the dysfunctional cognition Risk avoidance in each sample?

Based on the non-clinical data that have been adjusted using the square root transformation, the correlation coefficient revealed a medium positive significant score (r = .37, p < .001) supporting hypothesis 4.1C. This was further supported by the result revealed from the clinical sample, which, was slightly lower than the one based on the non-clinical sample (r = 0.22, p < .05).

Research question 4.1D: Is SPS significantly related to the dysfunctional cognition Depreciation and failure in each sample?

In this case, Spearman's rho and the Pearson correlation coefficient revealed a significant positive relationship between SPS and Depreciation and failure (r_{sp} = .16, p < .01; r = .28, p < .01). However, in addition to not supporting the stated hypothesis, the effect sizes were small in both analyses.

When analyzing the clinical sample, a Pearson correlation coefficient was found (r = 0.19, p < .05) that was similar to the one found in the non-clinical sample regarding its effect size.

Research question 4.1E: Is SPS significantly related to the dysfunctional cognition Avoidance of social support in each sample?

Similarly, Spearman's rho and Pearson's correlation coefficient revealed small significant positive results (r_{sp} = .20, p < .01, r = .24, p < .01), which supported hypothesis 4.1E. However, the results of the clinical sample did not support this hypothesis since the correlation coefficients were not significant (r_{sp} = 0.12, n.s.; r = 0.14, n.s.).

Research question 4.1F: Is SPS significantly related to the dysfunctional cognition Internalization of failure in each sample?

Finally, the result for the relationship between SPS and Internalization of failure was significant (r = .22, p < .01). In partial support of the hypothesis, the resulting effect size was small. This was further supported based on the data of the clinical sample (r = 0.25, p < .01).

Research question 4.1G: Do the sensitivity groups differ significantly on the particular dysfunctional cognitions that showed a significant relationship with SPS in each sample?

In order to validate these correlations further, it was tested whether the three sensitivity groups differed significantly from each other with regard to the particular dysfunctional cognitions

which previously revealed significant relationships with SPS. In order to answer this research question, mean score differences were calculated using the Kruskal-Wallis test and a one-way ANOVA. The procedure followed the one already applied in line with previous research questions. The following results were found in each sample:

- Scale measuring Dependency: Results from Kruskal-Wallis test ($H(2) = 10.88$, $p < .01$, $d = 0.45$) and the one-way ANOVA ($F(2,186) = 4.70$, $p < .05$, $d = 0.45$) reached statistical significance. The Dunn-Bonferroni pairwise comparison as well as Gabriel's post-hoc tests revealed that the low ($M = 3.25$, $SD = 0.61$) and the medium sensitive group ($M = 3.62$, $SD = 0.71$; $p_a < .01$) as well as the low and the high sensitive group ($M = 3.60$, $SD = 0.84$, $ps < .05$) differed significantly from one another on the sub-scale dependency. Related analyses were not conducted with the clinical sample as the correlation coefficient was not significant.
- Scale measuring Risk avoidance: The Kruskal-Wallis test ($H(2) = 22.92$, $p < .001$, $d = 0.71$) and the one-way ANOVA suggested significant overall differences between the sensitivity groups in the non-clinical sample ($F(2,186) = 13.86$, $p < .001$, $d = 0.26$). Post hoc procedures further revealed significant differences between the low ($M = 1,72$, $SD = 0.51$) and the medium sensitive group ($M = 2.09$, $SD = 0.65$; $ps < .01$) as well as between the low and the high sensitive group ($M = 2.38$, $SD = 0.74$; $ps < .001$). In comparison, the three sensitivity groups did not differ on this scale in the non-clinical sample ($H(2) = 2.41$, n.s.; $F(2,127) = 1.35$, n.s.). This was also true when considering only two sensitivity groups in the clinical sample ($H(2) = 2.41$, n.s.; $F(2,127) = 1.35$, n.s.).
- With regard to the sub-scale measuring Depreciation and failure, the Kruskal-Wallis test revealed an marginally insignificant result ($H(2) = 5.98$, $p = 0.50$, $d = 0.30$). The significant result of the ANOVA ($F(2,186) = 3.61$, $p < .05$, $d = 0.39$) is disregarded in this case, because the assumptions for conducting this statistical test were not met. Conducting the analysis based on the data of the clinical sample, non-significant results were found as well ($F(2,127) = 0.73$, n.s.).
- On the sub-scale measuring Avoidance of social support, both statistical tests for differences between the three sensitivity groups were statistically significant (Kruskal-Wallis test: $H(2) = 12.25$, $p < .01$, $d = 0.48$; ANOVA: $F(2,186) = 7.46$, $p < .01$, $d = 0.57$). In particular, the low ($M = 1.50$, $SD = 0.63$) and the high sensitive group ($M = 2.03$, $SD = 0.91$; $ps < .01$) differed significantly. Those analyses were not conducted based on the clinical sample due to the lack of statistical significance in the correlation analysis.

- Finally, the groups did not differ significantly based on the data of the non-clinical ($F(2,186) = 2.69$, n.s.) and the clinical sample ($F(2,127) = 1.92$, n.s.) on the sub-scale Internalization of failure.

Summary of Research question 4.1

Using two types of correlation analyses, the relationships between SPS and various dysfunctional cognitions across samples were analyzed. While a relationship between SPS and Perfectionism was not supported in either sample, a small statistically significant relationship with the tendency to avoid risks, internalize failure and to lower one's self-worth in cases of failure in participants with higher levels of SPS was found in both samples. Furthermore, a small positive relationship with Dependency and Avoidance of social support was only found in the non-clinical sample. However, no coefficients exceeded the threshold of $r = .30$, indicating a medium effect. In a second step, the respective sensitivity groups were compared in both samples separately. When looking at the three sub-scales that revealed a significant relationship with SPS in previously, results changed again: Specifically, the groups in the clinical sample did not differ from each other on any of the three scales. While the groups in the non-clinical sample did not differ with regard to Internalization of failure and Depreciation and failure either, the low and medium sensitive group and the low and high sensitive group differed significantly on the remaining scale measuring risk avoidance. In this case, the low sensitive group revealed the lowest scores on average. Finally, when considering the two sub-scales (i.e., Avoidance of social support and Dependency) that only revealed a positive association with SPS in the non-clinical sample, the following was found: The low and the high sensitive group differed significantly from each other on both scales, with the high sensitive group showing higher mean scores, while the low and medium sensitive group also differed significantly from each other on the scale measuring Dependency. The effect sizes were small (for the sub-scale on Dependency) and intermediate (for the sub-scales on Avoidance of social support and Risk avoidance).

8.2.4.2. Sensory-processing sensitivity and coping strategies across samples.

Research question 4.2: Can significant relationships between SPS and the different coping strategies be found in each sample?

Research question 4.2 was answered using methods of the previous one: The first step included correlation analyses, which represented the basis for the comparison of sensitivity groups across those strategies that were found to be significantly related to SPS. Both steps were applied to both samples.

Hypothesis 4.2A: SPS is significantly related to the coping strategy Resignation in each sample?

The correlation coefficient for the relationship between SPS and the square-root-transformed non-clinical data on the sub-scale Resignation was significant (r = .40, p < .001). A similar, but slightly smaller coefficient was found in the clinical sample (r = .39, p < .001). Thus, this hypothesis was statistically supported.

Research question 4.2B: Is SPS significantly related to the coping strategy Relaxation in each sample?

The non-significant, very small correlation coefficient of r = -.02 revealed that there was no relationship between the two variables of SPS and the coping strategy Relaxation in the non-clinical or the clinical sample (r = -.00, n.s.; r_{sp} = .02, n.s.).

Research question 4.2C: Is SPS significantly related to the coping strategy Exploration of positive experiences in each sample?

Similarly, the non-significant, very small correlation coefficient revealed no evidence for an association between the two variables, namely SPS and the coping strategy Exploration of positive experiences. This was true for both samples (non-clinical sample: r = -.07, n.s.; clinical sample: r = .00, n.s.).

Hypothesis 4.2D: SPS is significantly related to the coping strategy Social withdrawal in each sample.

Based on the significant (ps < .001) result of Spearman's rho (r_{sp} = .33) and the Pearson correlation coefficient (r = .37), an association between SPS and Social withdrawal was

statistically supported in the non-clinical sample and the clinical sample (r = .30, p < .01). Despite the small effect sizes, this hypothesis was statistically supported.

Research question 4.2E: Is SPS significantly related to the coping strategy Proactive problem solving in each sample?

No relationship was found between SPS and the coping strategy Proactive problem solving in the non-clinical (r = -.12, n.s.) or the clinical sample (r = .04, n.s.).

Research question 4.2F: Is SPS significantly related to the coping strategy Control of reaction in each sample?

Similarly, the relationship with Control of reaction also did not reveal a significant result in the non-clinical (r = .11, n.s.) or the clinical sample (r = .09, r_{sp} = .14, n.s.).

Research question 4.2G: Do the three sensitivity groups differ significantly on the particular coping strategies that showed a significant relationship with SPS in each sample?

In the second step, the three sensitivity groups were compared to each other on the two scales that previously revealed a significant association with SPS (i.e., resignation and social withdrawal) in both samples.

- On the sub-scale Resignation, the Kruskal-Wallis test (H(2) = 21.14, p < .001, d = 0.68) and the one-way ANOVA revealed significant results (F(2,186) = 14.19, p < .001, d = 0.78) for the non-clinical sample. Post hoc tests further showed that all groups differed significantly from one another (i.e., the low (M = 1.97, SD = 0.65) and the medium sensitivie group (M = 2.32, SD = 0.79): ps < .05; the low and high sensitive group (M = 2.83, SD = 1.02): ps < .001; the medium and high sensitive group: ps < .05). This result was supported by the clinical sample (F(2,127) = 5.98, p < .01). All three groups differed significantly from each other on a p-level of at least p < .05 with the high sensitive group revealing the highest mean scores (M = 3.45, SD = 0.93), followed by the medium (M = 2.93, SD = 1.01) and the low sensitive group (M = 2.57, SD = 0.64).
- Based on non-clinical data in the sub-scale Social withdrawal, the Kruskal-Wallis test revealed a significant result (H(2) = 18.35, p < .001; d = 0.62). This result was further supported by a one-way ANOVA (F(2,186) = 10.91, p < .001, d = 0.68). Both approaches of post-hoc procedures (i.e., Dunn-Bonferroni and the Games-Howell post-hoc test)

supported statistical differences between the low (M = 2.00, SD = 0.92) and the medium sensitive group (M = 2.44, SD = 0.92, ps < .05) as well as between the low and the high sensitive group (M = 2.91, SD = 1.16, ps < .001). These results were also found based on the data of the clinical sample (H(2) = 6.99, p < .05; F(2,127) = 3.88, p < .05). However, different from the previous results of the non-clinical sample, in the clinical sample only the medium (M = 2.94, SD = 1.22) and the high sensitive group (M = 3.52, SD = 1.08) differed significantly from each other (p < .05), while the low sensitive group reached mean scores similar to the ones of the high sensitive group.

Summary of Research question 4.2

Two coping strategies were found to be related to SPS in both samples: Resignation and Social withdrawal. When further analyzing the relationship through comparing the sensitivity groups of both samples, significant coefficients were found in both samples. However, while all three groups differed significantly from one another on the scale measuring Resignation in both samples, those differed with regard to the Social withdrawal sub-scale. Specifically, the low and the medium sensitive group as well as the low and the high sensitive groups were found to differ in the non-clinical sample, while in the clinical sample only the medium and the high sensitive group differed significantly from one another.

8.2.4.3. Sensory-processing sensitivity and self-efficacy across samples.

Research question 4.3: How is SPS related to self-efficacy in each sample?

Because self-efficacy has been part of numerous analyses in research on teacher professionalism and SPS, it is also analyzed in this study as possible moderating variable.

Hypothesis 4.3A: SPS is not significantly related to self-efficacy.

Self-efficacy was found to be significantly negatively correlated with SPS in the non-clinical (r = -.36, p < .001) and the clinical sample (r = -.33, p < .001), differed from the hypothesis generated based on previous findings.

Research question 4.3B: Do the sensitivity groups differ significantly regarding self-efficacy?

Furthermore, the sensitivity groups differed significantly from one another in both samples (non-clinical sample: $F(2,186) = 9.48$, $p < .001$, $d = 0.63$; clinical sample: $F(2,127) = 4.02$, $p < .05$, $d = 0.51$). In particular, the high sensitive group ($M = 2.84$, $SD = 0.47$) in the non-clinical sample differed significantly from the medium ($M = 3.07$, $SD = 0.47$; $p < .01$) and the low sensitive group ($M = 3.17$, $SD = 0.37$; $p < .001$), only the medium ($M = 2.86$, $SD = 0.48$), and the high sensitive group ($M = 2.65$, $SD = 0.43$) differed significantly from one another ($p < .05$) in the clinical sample.

PART 2 – Comparing the sensitivity groups of both samples to each other on SPS and additional variables

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8.2.4.4. Comparison of all six final sensitivity groups across both samples.

Research question 4.4: How do the six sensitivity groups across both samples differ regarding SPS?

This fourth research question in this section was approached similarly as the one above. In order to differentiate the two samples more clearly, the three sensitivity groups of the clinical sample are all depicted with a dotted line in Figure 41.

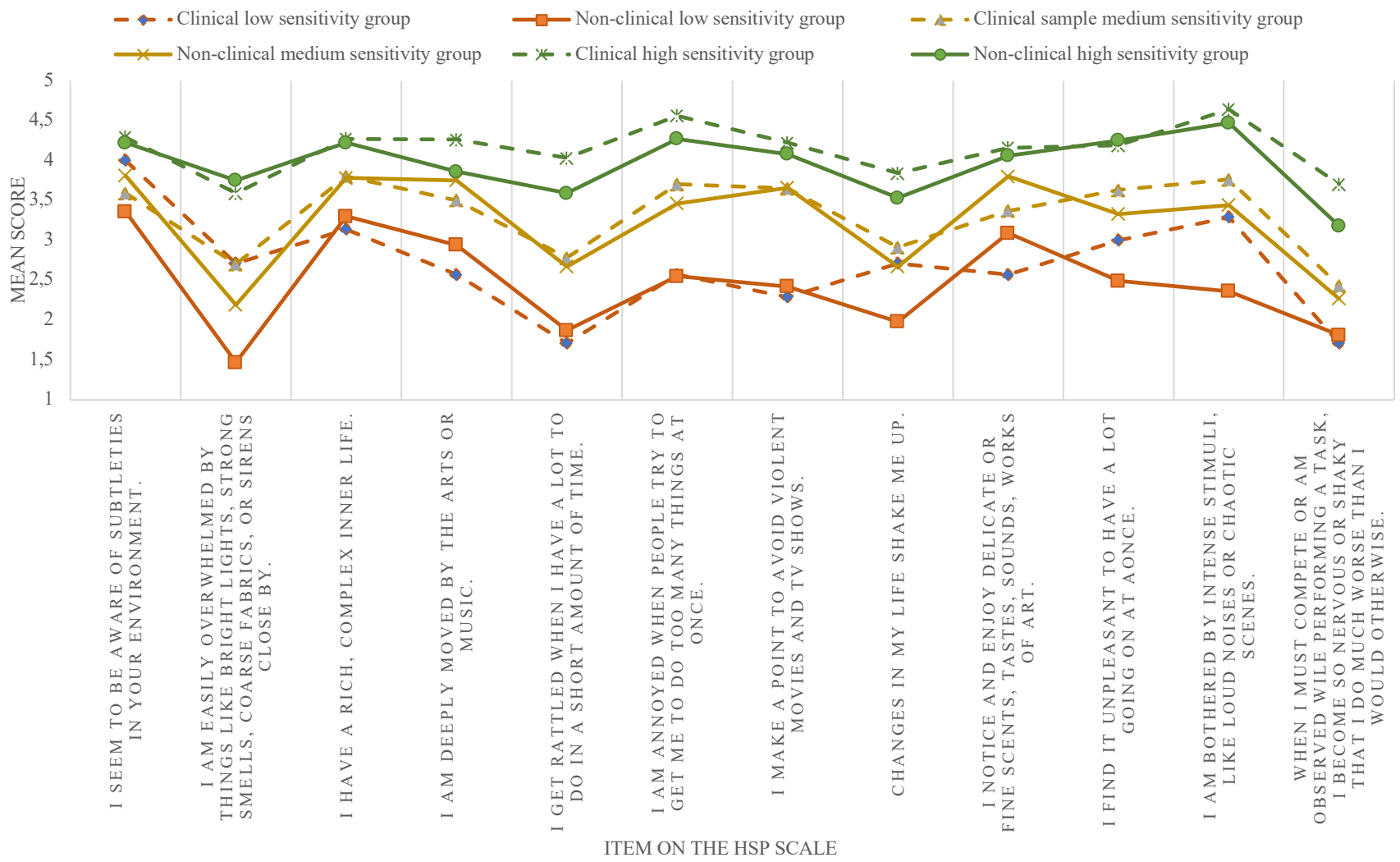

Figure 41. Distribution of the six sensitivity groups (i.e., Low, Medium, and high sensitive group in each sample) across all items on the HSP scale.

In addition to the general trend of the clinical sample reaching higher SPS mean scores across items, this was also found when differentiating between sensitivity groups. As is shown in Figure 41 the high sensitive group in the clinical sample scored higher than the high sensitive group in the non-clinical sample. When considering the medium and low sensitive groups, however, this picture was less clear. While in the medium and low sensitive groups, participants of both samples alternated regarding the extent to which they agreed on items (i.e., on some items, the participants in the clinical sample reached higher scores, while on others, those in the non-clinical sample scores higher), the scores were generally closer together in the medium than in the low sensitive groups. A statistical investigation of these questions follows in Research question 4.4A below.

Research question 4.4A: Do all six sensitivity groups differ with regard to their SPS mean scores?

Before this research question could be answered by conducting an ANOVA, a new variable had to be created to differentiate all siy groups from one another in one data set. The groups were named the follows:

- Group 1: non-clinical low sensitive group (n = 53);
- Group 2: non-clinical medium sensitive group (n = 85);
- Group 3: non-clinical high sensitive group (n = 51);
- Group 4: clinical low sensitive group (n = 7);
- Group 5: clinical low sensitive group (n = 47);
- Group 6: clinical high sensitive group (n = 76).

The overall H- and F-value suggested significant difference (ps < .001) between the six sensitivity groups when considering the two samples together ($H(5) = 276.34$, d = 5.18; $F(5,313) = 300.35$, $d = 0.34$). However, when further analyze which groups differed significantly from each other individually, this was not the case for all. Specifically, the non-clinical nline low sensitive group and the clinical low sensitive group as well as the non-clinical medium sensitive group and the clinical medium sensitive group did not differ significantly from each other on their mean scores. The remaining groups differed significantly from each other on a level of $p < .001$ (with the exception of the difference between the non-clinical high sensitive group and the clinical high sensitive group, which differed significantly on a level of $p < .01$).

Research question 4.4B: Do all six sensitivity groups differ regarding their SPS mean scores when controlling for variables of negative affect (i.e., Depression, Anxiety, and Stress)?

Because the difference between these groups is not only represents their scores on the SPS scale, but also their psychological well-being and their association with additional moderating factors of psychological well-being, it was investigated whether these differences could also be found when controlling for negative affect. In this study, negative affect was measured with three different variables (i.e., of Depression, Anxiety, and Stress), which will all be controlled for in the upcoming section. It is important to note that one of the assumptions necessary to conduct ANCOVAs were not fulfilled. While the homogeneity of regression assumption was met, the assumption of homogeneity of variance was not met as indicated by a significant value of the Levene's test. Therefore, results should be interpreted with caution.

Research question 4.4B-1: Do all six sensitivity groups differ regarding their SPS mean scores when controlling for Depression?

When controlling for Depression, the difference found between the groups was still significant ($F(5,312) = 225.86$, $p < .001$, $d = 0.28$).

Research question 4.4B-2: Do all six sensitivity groups differ regarding their SPS mean scores when controlling for Anxiety?

Similarly, the difference between sensitivity groups was still significant ($p < .001$) when adding Anxiety as a covariate into the analysis ($F(5,312) = 224.87$, $d = 0.29$).

Research question 4.4B-3: Do all six sensitivity groups differ regarding their SPS mean scores when controlling for Stress?

When controlling for Stress, the groups still differed significantly from each other on their SPS mean scores ($F(5,312) = 224.64$, $p < .001$, $d = 0.28$).

Summary of Research question 4.4

Research question 4.4 aimed at investigating whether the resulting six sensitivity groups (i.e., three groups in each sample) differed significantly on their SPS mean scores. Results revealed empirical support for the fact that all six groups differed significantly from one another, even after controlling for negative affect, which was operationalized by measures of Depression,

Anxiety, and Stress. Post hoc test results, however, showed that the two Low and the two medium sensitive groups did not differ significantly from one another (without controlling for any other variables).

8.2.4.5. Sensitivity groups of both samples and their differences regarding personal characteristics related to psychological well-being.

Research question 4.5: How do the two high sensitive groups (of both samples) differ on measures of to psychological ill-health as well as personality-related characteristics that are assumed to be associated with psychological well-being (i.e., dysfunctional cognitions, coping strategies, and self-efficacy)?

This research question aims at further understanding how the two high sensitive groups in both samples differed. This approach is in line with research on resilience, in which scientists try to explain why some participants can deal with obstacles and remain psychologically well (i.e., in the present study these would be represented by the participants in the non-clinical sample) and why others have more difficulties and are at risk of becoming psychologically ill (i.e., in the present study these would be represented by the participants in the clinical sample). In order to answer this research question, participants in the high sensitive group in both samples will be compared with regard to the additional person-related variables that are available for both samples.

Research question 4.5A: How do the two high sensitive groups (of both samples) differ regarding variables of psychological ill-health?

A preliminary analysis confirmed again that the two high sensitive groups differed significantly regarding their psychological well-being (i.e., based on their scores on the DASS sub-scales). In particular, participants in the clinical high sensitive group reached higher mean scores on all three variables. The following results, all ranging between intermediate and large effect sizes, were found:

- For Depression, the independent samples t-test ($t(125) = 4.54$, $p < .001$, $d = 0.82$) and the non-parametric Mann-Whitney U test ($U = -4.29$, $p < .001$, $d = 3.20$) statistically supported a significant difference between the two samples.
- The same was found on the sub-scale measuring Anxiety ($t(125) = 4.00$, $p < .001$, $d = 0.73$; $U = -4.00$, $p < .001$, $d = 3.15$).

- Finally, the two samples also differed on their mean Stress scores ($t(125) = 2.81$, $p < .01$, $d = 0.50$).

Research question 4.5B: How do the two high sensitive groups (from both samples) differ regarding personality-related characteristics that are assumed be associated with psychological well-being?

This analysis represented the second step of this broader research question. All variables included in previous analyses and results are analyzed in this research question. Table 48 below displays all results. It can be seen that the two high sensitive groups differed significantly on the variables of self-efficacy, work-life balance, and all coping strategies, but only on three dysfunctional cognitions (i.e., Internalization of failure, Depreciation and failure and Risk avoidance). In particular, the high sensitive group in the clinical sample reached scores that can be interpreted as an indication for more dysfunctional behavior and thoughts. For example, the participants in the non-clinical sample use more relaxation strategies, avoid risks less frequently, and control their reactions more, while the opposite was true for the high sensitive group in the clinical sample. Most effect sizes were small to intermediate.

Table 48

Summary of Means, Standard Deviations and Statistical Results of Mean Differences Between the high sensitive groups of Both Samples on Personality-Related Variables

Variable	Mean (M) and Standard deviation (SD)		Statistical test and effect sizes (Cohen's d / Hedges' g)
	Clinical sample (n = 76)	Non-clinical sample (n = 51)	
Self-efficacy	*M = 2.65* *SD = 0.43*	*M = 2.84* *SD = 0.47*	*t(125) = -2.39** *d = 0.43*
Work-life Balance	*M_R = 53.22* *M = 2.52* *SD = 1.14*	*M_R = 80.06* *M = 3.31* *SD = 1.11*	*U = 1119***, d = 0.77* *t(125) = -3.86**** *d = 0.70*
Dysfunctional cognitions			
Dependency	M_R = 67.08 M = 3.80 SD =0.77	M_R = 59.41 M = 3.60 SD = 0.84	U = 1704, n.s. t(125) = 1.34, n.s.
Internalization of failure	*M = 3.51* *SD = 0.95*	*M = 3.13* *SD = 0.96*	*t(125) =2.24** *d = -0.40*
Depreciation and failure	*M = 2.73* *SD = 1.04*	*M = 2.25* *SD = 1.20*	*t(125) = 2.41** *d = -0.43*

(continued)

Variable	Mean (M) and Standard deviation (SD)		Statistical test and effect sizes (Cohen's d / Hedges' g)
	Clinical sample (n = 76)	Non-clinical sample (n = 51)	
Perfectionism	M = 3.43 SD = 0.95	M = 3.30 SD = 0.87	t(125) = 0.81, n.s.
Avoidance of social support	M_R = 67.51 M = 2.27 SD = 0.99	M_R = 58.77 M = 2.03 SD = 0.91	U = 1671.50, n.s t(125) = 1.33, n.s.
Risk Avoidance	M_R = 66.45 M = 2.54 SD = 0.93	M_R = 60.34 M = 2.38 SD = 0.74	U = 1751.50, *n.s.* t(121,31) = 1.05, n.s.
Coping strategies			
Relaxation	*M = 2.80,* *SD = 0.85*	*M = 3.20,* *SD = 0.85*	*t(125) = -2.60** *d = 0.47*
Social withdrawal	*M_R = 3.33* *M = 3.52* *SD = 1.08*	*M_R = 2.33* *M = 2.91* *SD = 1.16*	*[2]U = 7118.50**** *t(125) = 3.05**** *d = -0.55*
Control of reaction	*M_R = 69.91* *M = 4.03* *SD = 0.76*	*M_R = 55.20* *M = 3.77* *SD = 0.71*	*U = 1489** *d = 0.40* *t(125)=1.92, n.s.*
Proactive problem solving	*M = 3.55* *SD = 0.68*	*M = 3.86* *SD = 0.62*	*t(125)=-2.61** *d = 0.47*
Exploration of positive experiences	*M = 2.70* *SD = 0.88*	*M = 3.22* *SD = 0.95*	*t(125)=-3.18*** *d = 0.57*
Resignation	*M = 3.45* *SD = 0.93*	*M = 2.83* *SD = 1.02*	*t(125)=3.53*** *d = -0.64*

Note. Italicized variables and descriptive statistics and the results of the respective statistical test represent statistical significance. M_R = Mean rank; U = Mann-Whitney-U test was applied, t = independent samples t-test was applied. n.s. = not significant.
*p < .05; **p < .01; ***p < .001.
[1]sample was transformed using the square-root-transformation in order to conduct the independent t-test analysis; [2]not possible to calculate effect size.

Research question 4.5C: How do the two high sensitive groups (of both samples) differ with regarding the perception of certain work place characteristics of teachers?

The two high sensitive groups were not found to differ on any of the analyzed characteristics of the work place, which included:

- Balance between work and personal life (t(125) = 1.46, n.s.);
- Lack of task completion (U = 2125.00, n.s.; t(125) = -1.04, n.s.);
- Lack of feedback (t(125) = -0.52, n.s.);
- different expectations toward teachers (t(125) = 1.26, n.s.);
- their perceived performance (U = 1855.50, n.s.; t(125) = 0.37, n.s.).

Summary of Research question 4.5

Research question 4.5 aimed at investigating on which variables the two high sensitive groups differed significantly. These included variables of psychological well-being (i.e., Depression, Anxiety, and Stress), variables associated with the onset of stress (i.e., self-efficacy, dysfunctional cognitions, coping strategies) and different work place characteristics (i.e., balance between work and personal life, lack of task completion, lack of feedback, and different expectations toward teachers), and their perceived performance. The results showed that the clinical high sensitive group reached higher mean scores on all variables of psychological ill-health, with intermediate to high (i.e., for Depression) effect sizes. Regarding the possible influencing variables, they differed significantly on self-efficacy, variables measuring work-life balance and all coping strategies with effect sizes in the intermediate range. With regard to dysfunctional cognitions, the two groups differed significantly on two cognitions (i.e., Internalization of failure and Depreciation and failure) both with smaller effect sizes. Investigating work place characteristics and perceived performance, no statistically significant difference between the two groups was found.

PART 3 – Taking HSPs of both samples together and investigating possible sensitivity types

8.2.4.6. Investigation of different sensitivity types.

Research question 4.6: Can different sensitivity types be found when taking the high sensitive groups of both samples together?

This question aims at investigating whether different sensitivity types can be found based on the items measuring SPS when considering both high sensitive groups together. Using cluster analysis (i.e., Ward method, squared Euclidean distance measures), this research question is answered in the following section.

The elbow criterion suggested the existence of three clusters that differed significantly (on a p-level of at least .05) on all but two items ("I am easily overwhelmed by things like bright lights, strong smells, coarse fabrics, or sirens close by" and "I am bothered by intense stimuli, like loud noises or chaotic scenes") as revealed by the one-way ANOVA and the non-parametric Kruskal-Wallis test.

Research question 4.6A: How are the two samples distributed across the resulting clusters?

The cluster sizes as well as the distribution of the samples (i.e., clinical or non-clinical) are represented in Table 49 below. It is important to note that for two participants in the clinical sample, an assignment was not realized by the statistical package, which led to a final sample size of 73 in the clinical sample and 51 in the non-clinical sample:

Table 49

Summary of Number and Percentage of Both Samples Across three Resulting Clusters (i.e., Sensitivity Types)

Cluster	Number (and percentage) of participants in each cluster (based on the respective sample)			Percentage of participants from both samples (based on the respective cluster)	
	Total	Clinical sample	Non-clinical sample	Clinical sample	Non-clinical sample
Cluster 1	*N* = 39 (31.45%)	17 (33.33%)	22 (30.13%)	43.59%	56.41%
Cluster 2	*N* = 39 (31.45%)	23 (45.10%)	16 (21.92%)	58.97%	41.03%
Cluster 3	*N* = 46 (37.10%)	11 (21.57%)	35 (47.95%)	23.91%	76.09%

Table 49 shows that participants were distributed relatively evenly across the three clusters. Only the third cluster, with 37.10% of the participants was slightly larger than the remaining two. Furthermore, when looking at how the two samples are distributed in each cluster (e.g., the two right columns in the table above), it is clear that in Clusters 1 and 3, the majority of participants were from the non-clinical sample (i.e., 56.41% and 76.09% respectively), while the majority of participants in the second cluster were from the clinical sample (i.e., 58.97%). This was also supported when looking at the two columns in the center of the table, representing the distribution of each sample across the three clusters: The majority of the clinical sample (i.e., 45.10%) was found in the second cluster, while exactly one third of the patients (i.e., 33.33%) were assigned to Cluster 1 and a little more than one fifth is assigned to the third cluster (i.e., 21.57%). Regarding the non-clinical sample, almost half of the participants are found in the third cluster (i.e., 47.95%), while roughly one third (i.e., 30.13%) were assigned to the first and roughly one fifth (i.e., 21.92%) to the second cluster.

Research question 4.6B: What are the specific characteristics of the resulting clusters?

The three resulting clusters are summarized in Figure 42 and further described below.

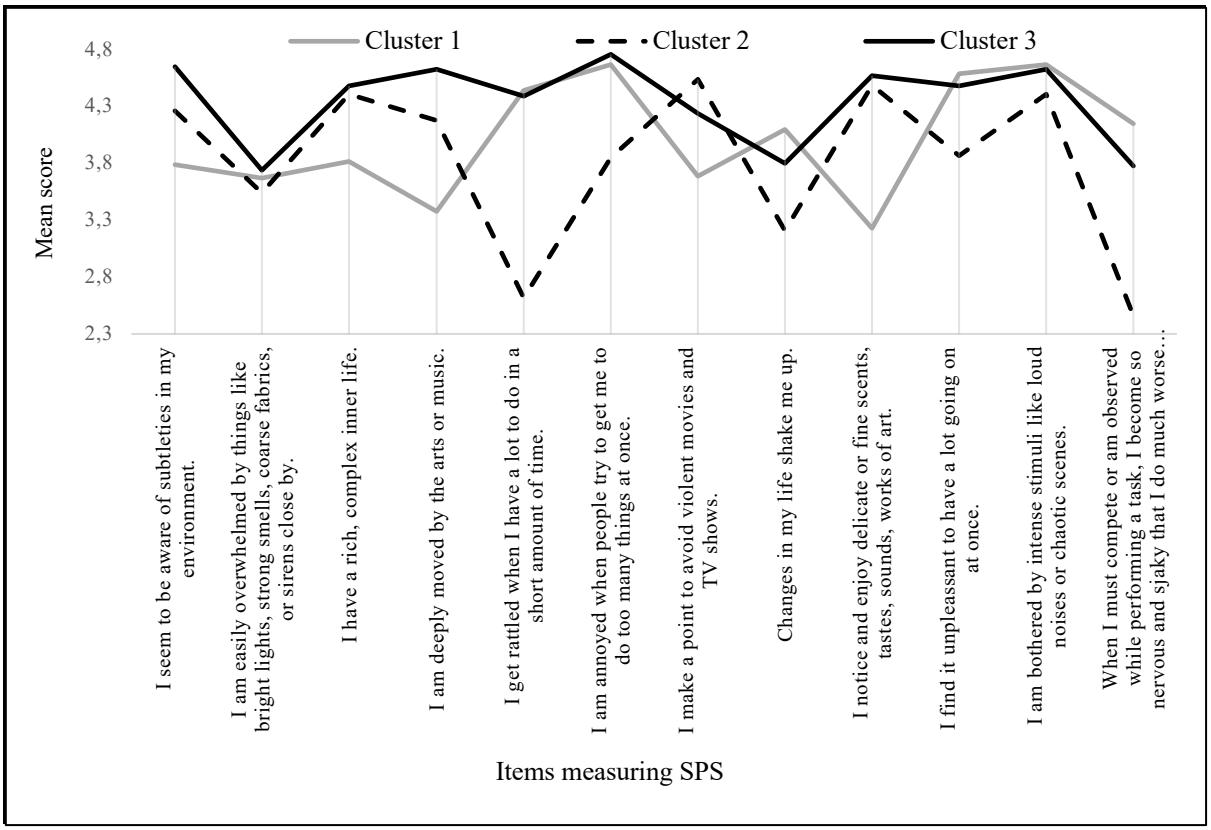

Figure 42. Distribution of the three resulting clusters across the individual items of the HSP scale.

- Participants assigned to the first cluster were characterized by their relatively high scores on items that measure having a lot to do at once and intense and chaotic stimuli. These were items that were found to represent the factor Ease of excitation in previous analyses based on the non-clinical sample. However, some of these high scores are similar to those reached by teachers assigned to the third cluster (i.e., as indicated by non-significant coefficients on the following items: “I get rattled when I have a lot to do in a short amount of time”, “I am annoyed when people try to get me to do too many things at once”, or ”I find it unpleasant to have a lot going on at once”). What makes them differ from teachers in the third cluster, however, are the comparably low scores on items, which were also found to measure Aesthetic sensitivity and Sensitivity to arts, also found in previous analyses (i.e., in the clinical sample; these two factors were found to be an overarching factor). Consequently, teachers in this cluster seemed to not perceive their inner life to be complex, are not moved by arts and music and do not enjoy or notice delicate tastes, sounds, and other aspects as much as HSPs in the other two clusters. Regarding items representing Low sensory threshold, there was also a tendency towards higher values. One exception was the

item “I make a point to avoid violent movies and TV shows” on which teachers in this cluster reached the lowest scores, while the scores on the remaining two items are similar to those found in the remaining two clusters. Based on these distinct characteristics, this cluster was called the Easily excitable HSPs with a tendency toward a low sensory threshold. When comparing these characteristics to general tendencies of HSPs, this group represented relatively high scores on the factors measuring Ease of excitation and Low sensory threshold, which is assumed to represent those aspects that make it more difficult for HSPs to handle stressful circumstances and lifestyles. However, a similar relative number of participants of both samples (i.e., around 30%) were assigned to this cluster.

- The second cluster represented the opposite of the first in several ways. Specifically, teachers in this cluster stood out by their relatively (i.e., in comparison to the remaining two clusters) high scores on items measuring aspects of Aesthetic sensitivity. In comparison, this group revealed relatively low scores on the two facets Ease of excitation, including items like “Changes in life shake me up”, “I get rattled when I have a lot to do in a short amount of time” or “I find it unpleasant to have a lot going on at once” (i.e., for all three items statistical comparisons with the other two clusters revealed significant results on a level of at least $p < .05$), or Low sensory threshold. One exception, however, to this aesthetically focused pattern was the item “I make a point to avoid violent movies and TV shows”, which originally has been assigned to the facet Low sensory threshold. Scores on this item were comparable to results in the third cluster ($p > .05$), but at the same time were higher on average than the one revealed in the first cluster ($p < .05$). As described above, this group showed an answering pattern focusing on the facet Aesthetic sensitivity, which is hypothesized to represent an indicator for the theory of vantage sensitivity. Based on this focus, the group is called Aesthetically-focused HSPs. Contrary to this hypothesis, most participants in the clinical sample were assigned to this cluster, while only one-fifth of teachers in the non-clinical sample were found to be in this cluster.
- Finally, the last group is described at this point: When looking at the distribution of mean scores across items, the comparably high scores throughout items are immediately apparent. The only two items on which HSPs in this cluster did not reach the highest or one of the highest scores are the items “Changes in my life shake me up” and “When I must compete or am observed while performing a task, I become so nervous and shaky that I do much worse than I would otherwise”, which both were originally and in previous analyses assigned to the factor Ease of excitation and Low sensory threshold (i.e., in previous

analysis with the non-clinical sample, the item on avoiding violent shows and movies has even been assigned to the factor Aesthetic sensitivity). Although the main characteristic of this cluster were the comparably high scores across items and facets, some differences across clusters on other items were not statistically significant. They are mentioned here for the sake of completeness. Teachers in the third cluster had higher scores than teachers in the other two clusters on the following items: "I am aware of subtleties in my environment" (*p*s > .05 for statistical comparisons with the other two clusters; pairwise comparisons based on the non-parametric Kruskal-Wallis test suggest a significant difference between Clusters 3 and 1), "I have a rich, complex inner life" ($p > .05$ for the statistical comparison with Cluster 1; pairwise comparisons based on the non-parametric Kruskal-Wallis test suggest a significant difference with Cluster 1, but not with Cluster 2), and "I am deeply moved by the arts or music" (*p*s < .05 for statistical comparison with the other two clusters). Based on this pattern, participants in this cluster can be described as Generally high scoring HSPs (across facets). With regard to the distribution of both samples in this cluster, it was found that the minority of the clinical sample, but a majority of the non-clinical sample were assigned to this group.

Research question 4.6C: Do HSPs in the resulting clusters differ regarding their perceptions of certain work place characteristics?

Research question 4.6D: Do HSPs in the resulting clusters differ regarding certain possible psychological variables related to the onset of stress (i.e., dysfunctional cognitions, coping strategies, and self-efficacy)?

Research question 4.6E: Do HSPs in the resulting clusters differ regarding the newly developed items that are assumed to connect SPS and the teaching profession?

The two hypotheses stated above are answered together. Basic results can be found in Table 50. In order to limit the variables included in these analyses, only those with statistically significant results in previous analyses were included in the table. Furthermore, only the mean scores and standard deviations are included in the table, even in those cases in which a non-parametric analysis was applied. Results in Table 50 below show that the clusters differed significantly on all variables related to the onset of mental illness as well as the two variables

measuring the balance between work and personal life. All remaining variables did not differ significantly across clusters.

Table 50

Summary of Means, Standard Deviations, and Statistical Test of Mean Differences Across the three Clusters on Work Place Characteristics, Perceived Performance and Personality-Related Variables significantly Related to SPS

Variable	Mean (M) and Standard Deviation (SD)			Statistical Test and Effect Sizes (Cohen's d / Hedges' g)
	Cluster 1 (n = 39)	Cluster 2 (n = 39)	Cluster 3 (n = 46)	
Work place characteristics (Research question 4.6C)				
Work-life Balance (Syrek et al., 2011)	*M = 2.8 SD = 0.96*	*M = 3.47 SD = 1.30*	*M = 2.32 SD = 1.02*	*F(2,121) = 11.60*** H(2) = 18.80****
Balance between work and life (Rothland, 2013)	*M = 3.19 SD = 0.45*	*M = 2.74 SD = 0.63*	*M = 3.27 SD = 0.64*	*F (2,121) = 9.47*** H(2) = 16.11****
Openness of tasks / lack of task completion	*M* = 3.29 *SD* = 0.72	*M* = 3.14 *SD* = 0.87	*M* = 3.48 *SD* = 0.68	*F* (2,121) = 2.10, n.s. *H*(2) = 3.66, n.s.
Lack of feedback	*M* = 2.68 *SD* = 0.56	*M* = 2.70 *SD* = 0.65	*M* = 2.80 *SD* = 0.69	*F* (2,121) = 0.44, n.s.
Expectations toward teachers	*M* = 2.92 *SD* = 0.48	*M* = 2.69 *SD* = 0.43	*M* = 2.87 *SD* = 0.51	*F* (2,121) = 2.67, n.s.
Educational freedom	*M* = 3.15 *SD* = 0.65	*M* = 3.33 *SD* = 0.62	*M* = 3.29 *SD* = 0.69	*F* (2,121) = 0.81, n.s. *H*(2) = 2.23, n.s.
Perceived performance	*M* = 3.19 *SD* = 0.45	*M* = 3.22 *SD* = 0.35	*M* = 3.15 *SD* = 0.45	*F* (2,121) = 0.26, n.s. *H*(2) = 0.29, n.s.
Psychological variables for the onset of stress (Research question 4.6D)				
Self-efficacy	*M = 2.61 SD = 0.40*	*M = 2.96 SD = 0.43*	*M = 2.60 SD = 0.45*	*F(2,121) = 9.41****
Dependency (DC)	*M = 3.96 SD = 0.76*	*M = 3.50 SD =0.77*	*M = 3.72 SD = 0.84*	*F(2,121) = 3.22** H(2) = 9.58***
Internalization of Failure (DC)	*M = 3.47 SD = 0.80*	*M = 3.03 SD = 0.87*	*M = 3.61 SD = 1.08*	*F(2,121) = 4.24** H(2) = 9.56***
Depreciation and failure (DC)	*M = 2.72 SD = 1.08*	*M = 2.08 SD = 1.00*	*M = 2.83 SD = 1.17*	*F(2,121) = 5.57*** H(2) = 11.54****
Risk avoidance (DC)	*M = 2.74 SD = 0.79*	*M = 2.08 SD = 0.67*	*M = 2.66 SD = 0.92*	*F(2,121) = 8.07*** H(2) = 15.89****
Social withdrawal (CS)	*M = 3.32 SD = 1.17*	*M = 2.81 SD = 0.95*	*M = 3.65 SD = 1.12*	*F(2,121) = 6.33***
Resignation (CS)	*M = 3.44 SD = 0.97*	*M = 2.54 SD = 0.89*	*M = 3.59 SD = 0.89*	*F(2,121) = 15.45**** H(2) = 25.68****
Additional items on the connection of SPS and the teaching profession (Research question 4.6E)				
I sense when a particular student needs help.	*M* = 3.49 *SD* = 0.56	*M* = 3.33 *SD* = 0.58	*M* = 3.51 *SD* = 0.51	*F*(2,121) = 1.27, n.s. *H*(2) = 2.18, n.s.
When a student is upset, I am affected almost as much as the student is, whether I show it or not.	*M* = 2.63 *SD* = 0.85	*M* = 2.69 *SD* = 0.80	*M* = 2.89 *SD* = 0.98	*F*(2,121) = 0.97, n.s. *H*(2) = 3.34, n.s.

(continued)

Variable	Mean (M) and Standard Deviation (SD)			Statistical Test and Effect Sizes (Cohen's d / Hedges' g)
	Cluster 1 (n = 39)	Cluster 2 (n = 39)	Cluster 3 (n = 46)	
I feel especially attuned to particular students who need help.	M = 3.46 SD = 0.64	M = 3.33 SD = 0.66	M = 3.37 SD = 0.65	$F(2,121) = 0.41$, n.s. $H(2) = 0.89$, n.s.

Note. Italicized variables, descriptive statistics and results represent those that reach statistical significance. DC = dysfunctional cognition; CS = coping strategy; M_R = mean rank. *p < .05; **p < .01; ***p < .001.

Figure 43 below depicts all variables on which the clusters differed significantly from one another. Regarding post hoc comparisons, statistical results from both analyses revealed the same results with one exception. Only on the scale measuring work-life balance by Syrek and colleagues (2011) did the post-hoc test of the ANOVA (i.e., Gabriel's) indicated that groups one and two also differed significantly from one another. As was the case in the previous analysis the assumptions of normality and homogeneity of variances were not met, thus, the Kruskal-Wallis test was applied as the respective result in this case. Furthermore, in some cases, the *p*-levels did not match across post-hoc comparisons. In those cases, the results of the analysis more appropriate with regard to the specific variable (i.e., based on whether the assumptions were met) was added as an indication into the figure.

The following two aspects become particularly clear when looking at the specific differences between clusters:

- Clusters 2 and 3 differed significantly from one another on all variables except on the dysfunctional cognition Dependency. With regard to this variable, only Clusters 1 and 2 differed significantly from each other.
- Across variables, Cluster 3 showed a more dysfunctional pattern (i.e., with higher scores on average on various dysfunctional cognitions), and more frequent use of dysfunctional coping strategies. Furthermore, teachers in the third cluster tended to have lower self-efficacy and more problems with their Work-life balance compared to the second cluster.
- Participants assigned to the second cluster, in comparison, revealed a less dysfunctional pattern, one that can be described as the opposite to that in Cluster 3.
- Finally, Clusters 1 and 3 did not differ significantly from each other on any of the variables (i.e., they reached similar mean scores across all variables). Therefore, Cluster 1, as did Cluster 3, also shows a more dysfunctional pattern.

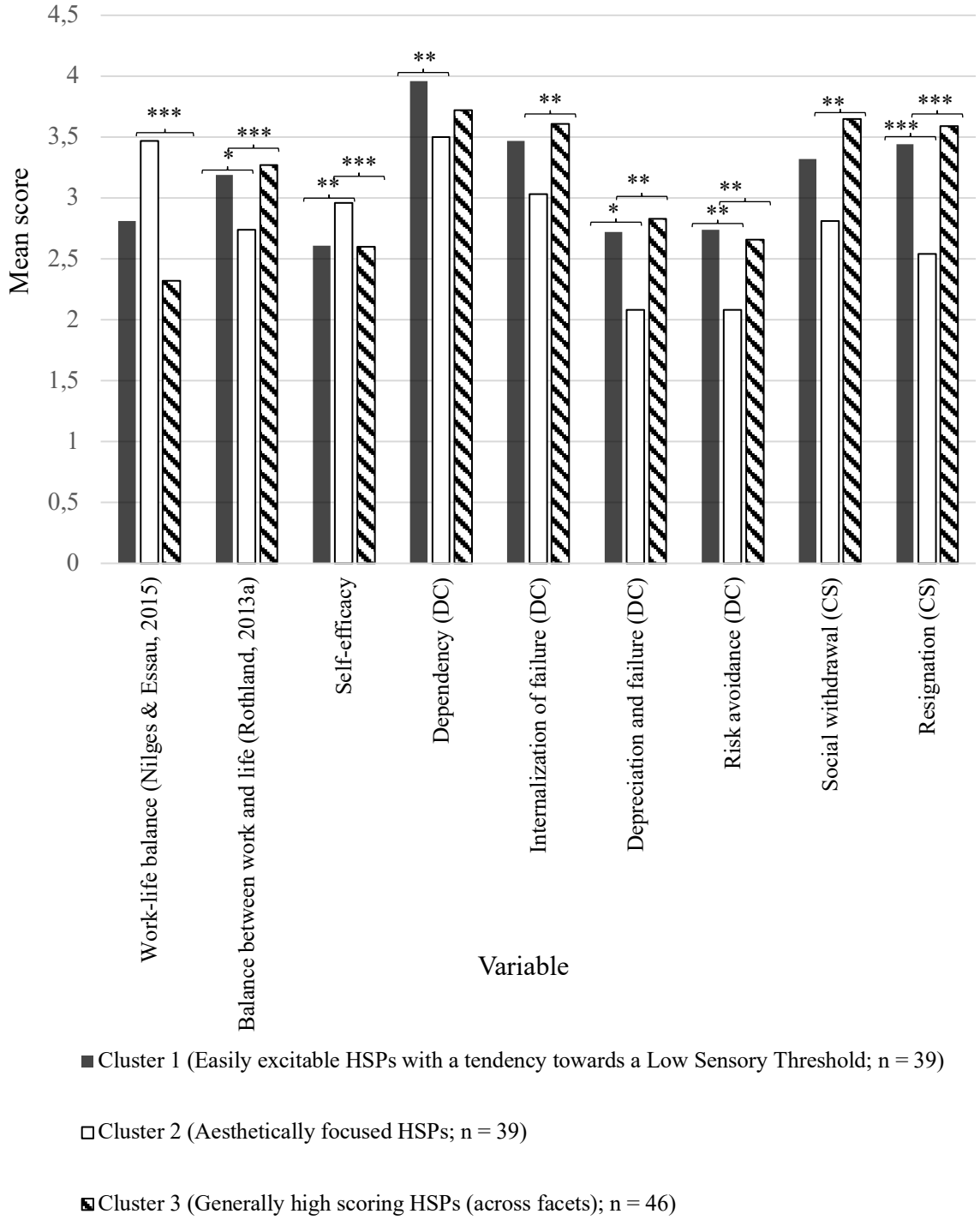

Figure 43. Mean scores of the three resulting clusters on variables that revealed statistically significant differences in the previous analysis. *$p < .05$; **$p < .01$; ***$p < .001$.

Research question 4.6F: Do HSPs in the resulting clusters differ regarding therapeutic success from a perspective of the theory of vantage sensitivity?

To be able to answer this research question, only the HSPs whose additional clinical data were available, were used as the data basis. Those were:

- $n = 17$ participants in Cluster 1,
- $n = 9$ participants in the second cluster, and
- $n = 25$ participants in Cluster 3.

In order to investigate possible differences between clusters regarding therapeutic success, the same indicators used in the second part of the results were applied again. Specifically, those were the differences in patients' BDI-II scores, difference in GAF scores, the CGI improvement score, the differences in T-scores on the BSI sub-scales, and the difference on patients' sum scores on the PHQ sub-scales. When looking at the respective statistical tests and the results, none of the F-values or H-values were statistically significant.

Summary of Research question 4.6

Considering different facets and characteristics related to SPS, a cluster analysis across the high sensitive group in both samples was conducted. Three groups of HSPs were extracted that significantly differed from one another regarding their specific characteristics. While the first cluster (i.e., which contained a relatively balanced proportion of participants in the non-clinical and clinical sample) reached high values on average on aspects of Ease of excitation and Low sensory threshold, participants in the second cluster, containing 45% of the HSPs in the clinical sample, seemed to be more aesthetically sensitive. In comparison, participants in the third cluster, which represented almost half of the HSPs in the non-clinical sample, showed relatively high scores across the different facets of SPS. When comparing these groups with regard to the psychological stress-related variables and characteristics of the teaching work place that have been found to be associated with SPS, it was found that Clusters 2 and 3 differed significantly from each other, while Clusters 1 and 3 reached similar scores. Specifically, participants assigned to the second cluster had more functioning results, including higher self-efficacy, less problems with their work-life balance, less strong dysfunctional cognitions and apply more functioning coping strategies on average than those in the third cluster. However, they did not differ significantly with regard to therapeutic success.

PART 4 – Testing a final model of stress including SPS

8.2.4.7. Developing an overarching final model for the onset of psychological ill-health in teachers including sensory-processing sensitivity.

This final analysis represents the integration of all findings revealed in this Results section. Specifically, the question that led this analysis was whether a model could be developed, which considers all variables associated with SPS, the onset of stress and mental illness in general, but also specifically regarding psychological well-being in teachers. Furthermore, it is the goal that the specific resulting model is related to existing models and is applicable for both samples. These goals led to the following final research question.

Research question 4.7: Is it possible to develop a model for the development of mental illness that is generalizable (and therefore applicable to both samples) and based on existing findings and models explaining the onset of stress, and can also be transfered to research on SPS?

The basis for this model was the model by Wittchen and Hoyer (2011; see chapter 4.3.3.) as it considers aspects of the diathesis-stress model (Monroe & Simons, 1991; see chapter 4.3.1.) and the transactional model of stress and coping (Lazarus & Folkman, 1984, see chapter 4.3.2.). Based on the findings with regard to the validity of SPS and the fact that it was successfully differentiated from other variables of psychological well-being (i.e., Depression, Anxiety, and Stress), SPS was found to play an important role with regard to teachers' professional lives and their perceptions of strain. For example, it has been found that people differ regarding their perceptions of certain workplace characteristics depending on their level of SPS (see chapter 8.2.2.). While they perceived themselves as having a stronger connection with students who need help (see chapter 8.2.2.1.) they also have more difficulties with workplace characteristics that are more open and flexible. In cases of challenging scenarios, such as striking a balance between personal life and work, SPS mediated the relationship between those characteristics and stress (see chapter 8.2.2.6.). Regarding possible psychological variables suggested in the model by Wittchen and Hoyer (2011), they were found to be significantly related to SPS. Specifically, the coping strategies Resignation and Social withdrawal were associated with SPS (see chapter 8.2.4.2.), while Risk avoidance, Depreciation and failure, Avoidance of social support as well as Internalization of failure represented dysfunctional cognitions that seemed to play an important role for HSPs (see chapter 8.2.4.1.). These dysfunctional cognitions are of

particular importance given the assumption of cognitive reactivity acting as the possible underlying mechanism (Wyller et al., 2017), but has not yet been investigated. Finally, regarding the link between certain mental illnesses and SPS, particularly Depression and Anxiety have been found to be related to SPS (see chapter 8.2.1.1.). Although these findings have been analyzed in more detail in the clinical sample (see chapters 8.2.3.1.), the more general tendencies are considered here (i.e., Depression and Anxiety), because those are the only measurements of mental illness available for both samples.

Although SPS was also found to enhance therapeutic success (see chapter 8.2.3.6.) and that HSPs differed with regard to the extent to which they showed certain characteristics and facets (see chapter 8.2.4.6.), these findings are not considered in this model since it aims at explaining the development of stress.

Based on the theoretical background of this study, other theoretical models, and findings of the present study, a model was developed and is depicted in Figure 44 below. It includes the resulting standardized regression weights. The coefficients written in orange in Figure 44 above represent the regression weights with self-efficacy included as a psychological factor (i.e., this is also the reason why the box with self-efficacy is colored in orange), while those in parentethes represent the resulting coefficients without self-efficacy. Both versions were applied because self-efficacy represents a relatively strong variable which is assumed to be related to the remaining variables, work place characteristics, and psychological well-being.

As is common in structural equation modeling and related analysis, the observable variables are depicted as squares, while unobservable (i.e., latent) variables are represented by ovals. The analysis was conducted using SPSS AMOS and maximum likelihood parameter estimation was applied without any post hoc modifications due to the confirmatory nature of the analysis.

Although the absolute fit indices for both models (with self-efficacy as a psychological factor: $\chi^2(429) = 1412.75, p < .001$; without self-efficacy as a psychological factor: $\chi^2(400) = 1291.81$, $p < .001$) and the relative fit indices (with self-efficacy as a psychological factor: RMSEA = .09; CFI = 0.79; NFI = 0.72; without self-efficacy as a psychological factor: RMSEA = .08; CFI = 0.80; NFI = 0.73) did not reach scores that can be interpreted as good or acceptable (Moosbrugger & Schermelleh-Engel, 2008, p. 319), the results revealed a first insight into the

role of SPS. This is true while also taking into consideration the remaining variables that have been found to play an important role in teacher stress. One exception to the values of the model fit indices, however, were both RMSEA scores that reached an acceptable fit.

Specifically, the relationship between perceived stress and SPS as well as psychological factors were the strongest, followed by the association between workplace characteristics (i.e., Work-life balance) and Stress. Finally, the relationships between SPS and workplace characteristics as well as psychological factors can be mentioned as important. A similar order (i.e., with regard to strengths of associations) can be found when excluding self-efficacy from the psychological factors. In this case, however, the coefficients were smaller.

In addition, not all items of the HSP scale had a significant effect on the latent variable of SPS. For example, items nine (i.e., "Changes in my life shake me up"), four (i.e., "I am deeply moved by arts or music"), and one (i.e., "I seem to be aware of subtleties in my environment") did not reach statistical significance and revealed the lowest standardized estimates (i.e., with self-efficacy as a psychological factors: 0.10, 0.19 and 0.16, respectively; without self-efficacy added and .11, .19, and .17). The remaining standardized scores ranged from .23 (item 7) to .72 (i.e., item 5) in both models (i.e., including and excluding self-efficacy as a psychological factor). When looking back at the original facet it was assigned to as well as the results of the present study regarding the construct's internal structure (see section 8.2.1.4.) it was clear that two out of the three items (i.e., items 4 and 1) belonged to the facet Aesthetic sensitivity, while the ninth item in the scale represents Ease of excitation.

All remaining variables, including psychological factors (i.e., standardized regression weights between .60 and .83 and .57 and .87 (i.e., with and without self-efficacy respectively)), perceived stress (i.e., standaradized coefficients were found to lie between .60 and .76 for both models), and the Work-life balnce characteristic of the workplace (i.e., standardized regression weights were found to be between .53 and .85 when including self-efficacy as well as between .54 and .85 when excluding self-efficacy) were significantly related to the respective underlying unobserved variable (i.e., psychological factors and the sub-scale measuring Stress)

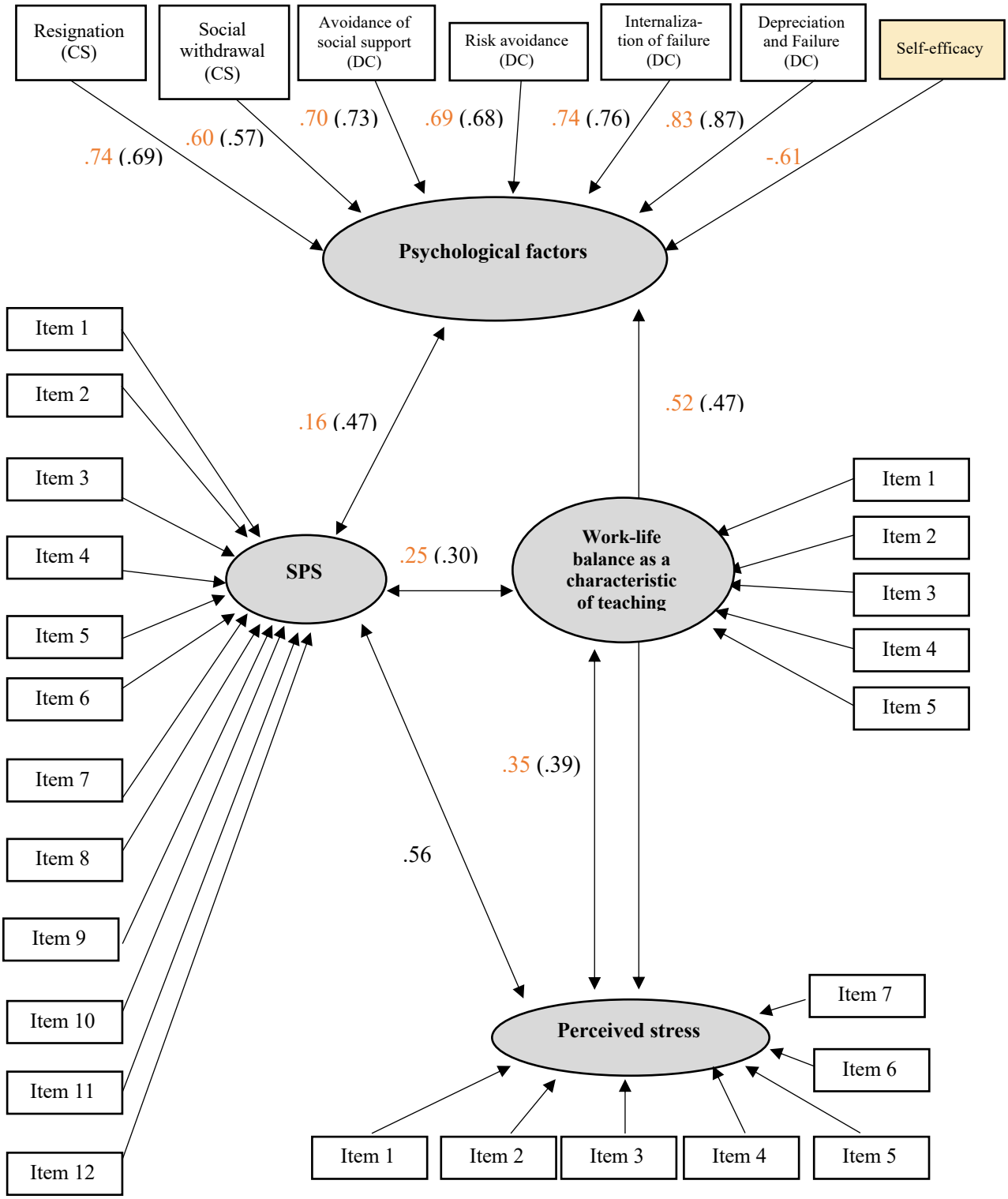

Figure 44. Results of the structural equation model developed based on existing models and research findings as well as results of the present study. The numbers on the arrows represent standardized regression scores. The error variables have been left out in this model. Coefficients colored in orange represent resulting regression weights when including self-efficacy as one psychological factor into the model. Orange colored box with self-efficacy represents the fact that some analyses were also conducted without self-efficacy as a psychological factor.

9. Discussion

The following chapter aims at summarizing and integrating the results of the present study (in chapter 8) into the broader research fields of SPS, teacher professionalism and teacher health research (chapter 9.1.). Furthermore, it offers reflections on practical implications (chapter 9.2.). Finally, the study's design and methodological approaches are reflected critically, its limitations are disclosed, and based on these considerations, suggestions are made for future research (chapter 9.3.). Finally, the discussion closes with a conclusion (chapter 9.4.)

9.1. Summary of Results and Integration into the Research Fields

Based on an initial investigation of the validity of the construct of SPS the present study sought to contribute to two existing research gaps in the scientific field of SPS (Greven et al., 2018), which concern the workplace context and health-related issues. First, it aimed to investigate the role of SPS in the work place. In particular, the focus of the present study was on the teaching environment and the role of SPS regarding the perception of various workplace characteristics and related strain of teachers. Second, it aimed to delve more systematically into the investigation in clinical contexts, including the consideration of specific symptoms and disorders as well as the analysis of therapeutic success. Also in line with these two goals is the comparison of both samples regarding SPS, the identification and differentiation between different types of HSPs, and the development of one overarching model to represent the onset of stress in the teaching profession including the role of SPS and related findings.

Because some of the results overlap and complement each other, they will be discussed together. Taking these relationships into account, the results of the present study are discussed in line with the important key findings along the following nine theses, which also serve as an outline for the upcoming sections.

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1) Sensory-processing sensitivity is a reliable and valid construct that can successfully be differentiated from measures of psychological well-being;
2) Highly sensitive teachers are more attuned to their students in need, but do not show enhanced processing of teaching-related aspects;
3) Highly sensitive teachers perceive workplace characteristics differently – particularly those characterized by openness and flexibility – but themselves as similarly successful;

4) Sensory-processing sensitivity can explain the relationship between certain work place characteristics and perceived stress through underlying cognitive processes and coping;
5) Teachers in the clinical sample are more sensitive on average than those in the non-clinical sample;
6) Sensory-processing sensitivity relates to teachers' depression, anxiety, and other psychosomatic disorders;
7) Highly sensitive teachers benefit more from therapeutic interventions than non-highly sensitive teachers, particularly regarding their most common mental disorders;
8) Highly sensitive teachers ≠ highly sensitive teachers – first exploratory evidence for the existence of different sensitivity types;
9) In addition to other variables, sensory-processing sensitivity can contribute significantly to the development of teacher stress – a tentative, overarching model.

9.1.1. Sensory-processing sensitivity is a reliable and valid construct that can successfully be differentiated from measures of negative psychological well-being.

One critical aspect regarding recent research on SPS over the last few years has been its relationship with negative affect and decreased psychological well-being as well as its misinterpretation as a mental disorder (Meißner, 2015). Although SPS was originally not being conceptualized as a weakness or an issue of psychological ill-health (E. N. Aron & Aron, 1997), its association with negative affect is important to consider, especially when investigating the HSP scale's discriminant validity. Results of various studies have found correlations that are in support of the assumed validity (e.g., E. N. Aron & Aron, 1997; Lionetti et al., 2018; Yano & Oishi, 2018). Most of these results revealed small to medium effect sizes and further complement the evidence for the scale's discriminant validity when tested against different scales like the Big Five personality traits (e.g., McCrae & Costa, 2008; see for example also E. N. Aron & Aron, 1997; Lionetti et al., 2018; Ahadi & Basharpoor, 2010). The present study's results further support these findings; when looking at the association between SPS and Depression, the results of the present study were, in part, significantly higher than those of existing studies (e.g., Liss et al., 2005, 2008; Neal et al., 2002; Yano & Oishi, 2018), or at least similar (e.g., Liss et al., 2008). Regarding the relationship with anxiety, the integration of results is more complicated because previous studies investigated specific anxiety disorders, such as social anxiety/phobia, agoraphobia (Hofmann & Bitran, 2007; Neal et al., 2002) or trait anxiety (e.g., Liss et al., 2005). However, contrary to the findings regarding Depression, the

present results on anxiety supported previous findings and were within the range of coefficients found in different studies (e.g., Hofmann & Bitran, 2007; Neal et al., 2002) or even slightly lower (Bakker & Moulding, 2012; Konrad & Herzberg, 2017). The different foci regarding anxiety disorders might explain this relatively wide range of findings. Finally, the relationship between SPS and Stress was analyzed. Comparing the few published studies to the result of the non-clinical sample, correlation coefficients were slightly higher than the coefficients revealed by Bakker and Moulding (2012) or Benham (2006). However, when considering the clinical sample alone, the correlation was significantly lower than those revealed in the two aforementioned studies. The reason for this comparably low correlation might lie in the shifted significance of different symptoms for each of the samples with the clinical sample showing generally more severe symptoms in other areas of psychological ill-health.

In addition to revealing empirical support for existing findings, the present study also supports previous evidence for the differentiation between SPS, Depression, Anxiety, and Stress. In particular, it was investigated whether Depression, Anxiety, Stress, and SPS represented four distinct factors in both samples separately and in the total sample. Although the findings of the CFA did not support the construct's validity across samples due to a lack of total model fit, an EFA was conducted in order to investigate the reason for this misfit and possible overlaps between the constructs.

When considering the non-clinical sample, surprisingly, a mix of items from different variables were found in only three factors, two of which represented a mix across the DASS-sub-scales (Nilges & Essau, 2015). In particular, Depression and Anxiety as well as Stress and Depression have been found to be mixed in the results of the EFA. Regarding SPS, on the contrary, only one item (e.g., "I am easily overwhelmed by things like bright lights, strong smells, coarse fabrics, or sirens close by") was found in a factor that included two items on Anxiety, which further supports the assumption that those variables can be differentiated.

Furthermore, the 11 items from the resulting factors were further separated into three factors. While two factors aligned with those suggested by Smolewska and colleagues (2006), one factor represented a mix of two items of the AES (i.e., Aesthetic sensitivity) facet and one item originally assumed to belong to the LST (i.e., Low sensory threshold) facet. This could be

explained by the fact that these each measured some aspects of art (e.g., delicate or fine scents, tastes, works of art, movies and TV shows, arts or music).
Conducting the same two previously described analyses with the clinical sample, a similar, and, in fact, clearer result was found regarding SPS: Despite the fact that fewer items measuring Depression, Anxiety, and Stress were included in the final factorial structure, these results only suggest a mix of items across the aforementioned three variables of psychological well-being (i.e., Depression, Anxiety and Stress). On the contrary, no items of the HSP scale were found in any of the three factors measuring psychological well-being. In addition, when looking at the HSP scale and the different facets, they represented those suggested by Smolewska and colleagues (2008) almost exactly. One difference, however, was the division of the EOE (i.e., Ease of excitation) facet into two different factors. One of these factors was called Multitasking in the present study because it included items that describe being overwhelmed due to a variety of simultaneous stimuli, while the second one includes being shaken up by changes and getting nervous about being observed while performing. No mixture between SPS sub-facets was found and, as was already the case with the non-clinical sample, all but one item from the original HSP scale applied in the present study was also included in the final factor structure.

Summarizing the results, three reasons are assumed to explain the fact that the present study's data did not fit the confirmatory model including the four variables, namely SPS, Depression, Anxiety, and Stress. First this is due to the mix of items across sub-scales of measures of psychological well-being; secondly, some items have not been included in the results of the EFA; finally, it is assumed to be due to the fact that the items measuring SPS were already divided into sub-facet in the EFA which was not accounted for in the confirmatory analysis.
However, looking at these results, the revealed evidence supports the claim that SPS (in its different facets) can be differentiated successfully from measures of Depression, Anxiety, and Stress.

9.1.2. Highly sensitive teachers are more attuned their students in need, but do not show enhanced processing of teaching-related aspects.

Because the two main characteristics of SPS represent deeper information processing and the enhanced emotional reactivity (e.g., E. N. Aron & Aron, 1997; E. N. Aron et al., 2012), which represents the underlying mechanism of the first, the roles of those two characteristics in the teaching profession was also investigated. A specific scale measuring these two aspects in the

context of teaching was developed for the present study. Due to the lack of statistical support for a two-factor structure in the present study, the two aspects were analyzed on the on the individual item level.

Regarding to teachers' attunement to students, my results revealed that HSPs (i.e., Highly Sensitive Persons) seem slightly more attuned to students who need help. Furthermore, they became more upset themselves when their students are upset and perceived to sense more accurately when students need help than non-HSPs do. These findings closed an important research gap with regard to SPS and HSPs' empathy and care for other people. Although these aspects have been previously theoretically linked (see Stefan Lindsay, 2017), this study provides the first empirical evidence for this link. It also supports the existing assumptions suggesting enhanced empathy, reflective ability and enhanced responsiveness to others' moods (Acevedo et al., 2014; E. N. Aron et al., 2012). Interestingly, however, is the fact that this association was only found regarding students who need help.

Despite this, the item asking teachers about a general connection with their students were not statistically significantly correlated with SPS. This is surprising given that based on the characteristics associated with HSPs, one would assume that HSPs would feel connected to their students generally, independent of their level of need. Their emotional responsivity and focus seemed to be targeted toward aspects in the classroom that do not work properly as well as students who need and demand action. In line with this view point is also the second surprising result: While highly sensitive teachers were found to be particularly affected by their students' negative moods, the same was not true for positive moods. This finding is not only surprising, but rather contradicts the empirically supported theory of enhanced reactivity to positive stimuli (e.g., E. N. Aron et al., 2012). Specifically, this reaction was found to be be even stronger than HSPs reactivity to negative emotions (E. N. Aron, 2012). This is particularly important given that it contradicts the recent development in the field of SPS toward the perspective of positive effects of positive experiences (e.g., Pluess, 2017). One explanation, which takes on the aforementioned focus on need, would be the sense HSPs are assumed to need regarding everything they do (e.g., E. N. Aron, 1997). One profession that is assumed to fulfill this need is teaching, because of the role and importance of the profession in society, as suggested by E. N. Aron (1997). This would be in line with the person-situation debate that suggest people to shape their environment (Furr & Funder, in press): "Individuals enter

environments because of their personalities and remain in those environments because of the reinforcements and satisfactions obtained through the interactions in that environment" (Walsh, 2006, p. 622). Selecting teaching as a profession would, therefore, not only align well with HSPs' characteristics, but also includes an important responsibility and role in society as teachers prepare students for their future lives in society through helping them to learn and develop (OECD, 2014; Terhart, 2010).

The idea that HSPs' sensitivity to students in need additionally reinforces their professional purpose as suggested by Rothland (2013). As part of a new scale based on Rothland's description of teachers' workplace characteristics, teachers were asked whether they perceive their influence on students' performance to be significant. The high and the medium sensitive group on average was found to reported higher scores on average than the low sensitive group, suggesting that people with higher levels of SPS are more convinced of their opportunity to make a difference for their students. This is true despite their stronger awareness of the fact that it is almost impossible to meet all the needs of all students, which was also measured based on conceptualizations by Rothland (2013) and followed the same tendency as the item on their influence on their students (i.e., the high and medium sensitive groups were on average more aware than the low sensitive group).

Another possible explanation for the lack of increased reactivity to positive emotions could be a negative bias within the HSP scale. For example, many items ask about negative effects of overstimulation (e.g., "I am easily overwhelmed by things like bright lights, strong smells, coarse fabrics, or sirens close by" or "I am annoyed when people try to get me to do too many things at once"), which leads to stronger associations with those items that are also negatively phrased. In comparison, the positive effects are only represented in the context of arts (e.g., "I am deeply moved by the arts or music"), while items measuring the aspect of emotional responsiveness aspect are missing completely. This is the reason why a group of international researchers have started to develop new items on this important aspect that can be added to the existing scale (E. N. Aron, Aron, Pluess & Lionetti, personal communication).

While the first part of the scale (i.e., the Attunement to students) was found to support assumptions with regard to HSPs' characteristics, the integration of results was more difficult considering the second part of this scale, measuring Deeper processing of information within

the teaching context. Results suggested that highly sensitive teachers did not differ from non-highly sensitive teachers on any of the items measuring teaching-related information processing. Namely, they did not seem to think more about their teaching (although a tendency toward a negative association was visible in the data), nor did they perceive themselves to be creative. Further, they were not convinced that their own professional decisions throughout their teaching careers were positive. Given the basic characteristics related to SPS (e.g., E. N. Aron & Aron, 1997), and previous findings on associations with creativity (Bridges & Schendan, 2018b) these findings were unexpected and even contradict existing research and theories. In particular, because HSPs generally process information in general more deeply, it would be expected that they would also process information related to their teaching practice (e.g., teaching methods, tasks for students, etc.) more deeply as well. Furthermore, given their thinking about most situations, including decision-making opportunities, one would also expect them to be content with their decisions. The fact that this is a newly developed scale and that research on HSPs in the teaching profession within the context of certain profession-specific characteristics is a growing field, the upcoming approaches towards an explanation are based on the available theoretical assumptions and represent preliminary hypotheses on the underlying mechanisms.

The first item aimed at to evaluate teacher decision-making. The main reason for the lack of association between SPS and this item might be two-fold and relate to lack of specificity of the item. First, it is not clear from the item what a *good decision* is. Similarly, it is not clear for whom situations are found to be *good*. Is it for the teachers themselves, their students, administrators or for the school itself? Additionally, given that lack of feedback is common in the teaching workplace (e.g., Rothland, 2013), how would teachers be able to know whether a decision was good, particularly if the decision was meant to be good for a certain student? The item's phrasing leaves room for interpretation and, therefore, ambiguity, which might have been reflected in the results. Further, decisions that teachers make, particularly for their students, are dependent on a variety of additional factors. Decisions regarding teaching methods, for example, only contribute to a learning opportunity for students, but do not consequently lead to successful learning. This uncertainty has been repeatedly discussed as one specific characteristic of the teaching profession (Kiel & Pollak, 2011; Rothland, 2013), in the literature on teaching professionalism, such as the structural-theoretical approach (e.g., Helsper, 1996, 2004), and related models of teaching, such as the utilization of learning

opportunities model (e.g., Helmke, 2007, 2009, 2012). Whether a teaching strategy leads to an increase in student knowledge, for example, is dependent on numerous facets, such as students' previous knowledge, their motivation, their cognitive abilities and so much more (e.g., Helmke, 2007). Therefore, teachers' decisions, may they be good, as stated in the item, or less good, are not just dependent on the teachers themselves. This item can, therefore, not been answered concisely and in a meaningful way, which might have influenced the present findings. As a final remark, the contrary statement of the assumption stated in the beginning of this paragraph should be mentioned. Because HSPs tend to think a lot about decisions and process more information related to those, this can also lead to discontentment. This is particularly true if, for example, a tendency to ruminate is present in HSPs, which might increase insecurities about decisions.

The second item in this second part of the scale was "One of my strengths as a teacher is my creativity". Although previous findings supported associations between SPS and creativity (Bridges & Schendan, 2018a, 2018b), those findings were not context-specific. In contrast, the present study assessed this item in the specific teacher environment. Therefore, creativity in this regard was interpreted within the teaching framework. While this item was also phrased vaguely and it is not clear to the reader what exactly is meant by creativity (i.e., teaching method, choice of exercise, assessment methods, etc.), the range of opportunities to be creative was already limited through the inclusion of the teaching context. Although teachers do have some freedom in their teaching practices, there are also regulations they have to follow such as class schedules and curricula (e.g., Rothland, 2013). This can lead to restrictions on creativity, a diverse interpretation of what creativity is within the context of teaching, and, subsequently, ambiguous and inconclusive results like in the present study.

Finally, this second part of the scale included the item "I think deeply about how I have taught and will teach." At first glance, the non-significant correlation with SPS seems counter-intuitive, given the distinct and obvious connection to the depth of processing-aspect, which is assumed to be one of the four central characteristics of HSPs (E. N. Aron & Aron, 1997; E. N. Aron et al., 2012). Rather, one would have expected a particularly strong association with this teaching-related information processing aspect given HSPs' general tendency to process information more deeply and considering different options before making decisions. However, one possible explanation may concern the role of teachers' perceived connection with their

students as described in the previous section. This association suggests that highly sensitive teachers might value their connection with students more than they value detailed planning. Their existing connection with students in need in particular, already offers evidence for their flexibility and ability to adjust their teaching to the needs of the students, rendering detailed planning to seem less important. Consequently, their lesson planning might already be very flexible and based on the students' needs so that a lot of thinking might not be necessary any more. Here, Helsper's (2002) antinomies come into mind. In particular, the antinomy of organization might play an important role; while on the one hand, teachers must adhere to standards, routines, and rules, the openness for interaction and flexible interaction with students represents the opposite aspect. This strong focus on the interaction with students, while at the same time taking into account the existing rules and routines as well, leave little room for much thinking with regard to teaching.

9.1.3. Highly sensitive teachers perceive workplace characteristics differently – particularly those characterized by openness and flexibility – but themselves as similarly successful.

One main research question in this study was whether teachers with high levels of SPS perceive their working environment differently. In comparison to the scale addressed in the previous section, which focused specifically on two characteristics of SPS and aimed at transferring those to the teaching context, the second main goal of the study aimed to investigate possible relationships between SPS and more objective descriptions of workplace characteristics. In order to answer the related research question, a scale measuring different characteristics as suggested by Rothland (2013; for more detailed information, see chapter 2.2.1.2.) was developed and applied in the present study.

Results suggested that SPS was significantly positively related to the following work place characteristics:

- Difficulties retaining a balance between work and a personal life;
- Openness of tasks;
- Lack of feedback;
- Diverse expectations.

When looking at the four scales and the common underlying structure, it becomes clear that all four aspects have a certain level of flexibility and openness in common: In particular, highly sensitive teachers felt especially insecure about the amount of time and energy they must invest in addition to their lessons and about the point at which their engagement suffices. Furthermore, they were aware of the lack of feedback they receive, which makes it difficult to accurately evaluate their own behavior and teaching practices in the long term (Rothland, 2013). Finally, teachers face numerous expectations in their everyday work, some of which are difficult to fulfill, while others are even contradictory. This represents the so-called existence of a double contingency between one's own and other peoples' expectations of one's actions (Luhmann, 1984, 1991, 2004) and further supports the existence of teachers' perceived uncertainty (Husén & Postlethwaite, 1994). Although the correlation effects with SPS found in the present study were all small, these results suggest that HSPs perceived this flexibility particularly strong. Similarly, this openness and flexibility aspect of the teaching practice can also be interpreted in line with the uncertainty that has been interpreted as central to the teaching professionalism (Helsper, 2014; Kiel & Pollak, 2011; Shulman, 1987). It can, for example, be found within interactions between teachers and students in the classroom or regarding to teachers' success in teaching.

One underlying mechanism that may indirectly explain why HSPs are particularly challenged by this uncertainty is the awareness of subtleties that are often hidden for people without the trait (E. N. Aron & Aron, 1997). This can include some students' needs for individualized teaching or more engagement from the teacher outside of the classroom, involving, for example, more frequent meetings with parents of external help organizations. A few more examples could be that HSPs are more inclined to notice students' subtle behavior changes, such as acting out or appearing to be depressed for a longer period of time, a sudden drop in performance, or observations by the teacher that would suggest bullying. In support of this assumption are the findings described in the previous section, suggesting highly sensitive teachers perceived particularly strong attunement to students in need.

This, of course, also transfers to feedback. Highly sensitive teachers might perceive cues in students' behavior and actions more frequently, which they often use to evaluate their own success. Because lack of feedback is common in the teaching profession, they will not be able to compare their own observations (in students) with some objective evaluation, further reinforcing their awareness for reality and the following insecurity.

Another common characteristic of HSPs is regular reflection which may also be related to their uncertainty. People with this trait tend to reflect their own behavior, their performance, all demands and expectations that they have to meet more deeply and frequently than others. A better understanding of this aspect of information processing can be gained by considering the results of the qualitative study with highly sensitive teachers (Stefan Lindsay, 2017) in support of this suggestion. In particular, the majority of interviewees were found to reflect on a variety of aspects regularly, focusing on past behaviors and situations, but also the future and possible outcomes. Drawing this connection seems particularly relevant in this context, as some teachers were working in special needs education where the students' needs were the main focus. Although a comparison and transfer of results might be limited due to different samples and measures applied, this might also apply to the aspect of expectations and the openness of tasks. One participant in Stefan Lindsay's (2017) study even described the inevitable connection of teaching life to the private life, further supporting the notion of blurred boundaries between personal and private lives of highly sensitive teachers found in the present study.

Another characteristic that can indirectly explain this relationship is the HSPs' empathy and care. Stefan Lindsay (2017) found that highly sensitive teachers want to serve, support and help students. Comments like "I find myself more like a father" (p. 73) further support the assumption that HSPs search for deeper meaning in their actions (e.g., E. N. Aron, 1997). This greater sense and the reward they receive from their job might also get them through challenges and difficulties that come along with the other characteristics, such as the flexibility and insecurity described above.

At the same time, however, SPS was not found to influence teachers' perception of their own performance. Rather, HSPs and non-HSPs perceived themselves as equally successful in their teaching. Based on the main possible mean score reachable on this scale (i.e., 4.00), all participants seemed to evaluate their performance on the upper end of the scale (i.e., with mean scores above 3.17). This suggests that teachers perceive themselves as successful as teachers, which can be interpreted as positively in the present study. Similar to previous findings, these results fill an existing research gap and broaden the research field. However, one potential reason for this finding might be the nature and specificity of their task and the greater sense they see in their teaching (E. N. Aron, 1997), particularly given their focus on and attunement to students, who need help, as described above.

Furthermore, not in line with the original hypothesis, the relationship between SPS and perceived performance was not mediated by perceived Stress, Depression, or Anxiety. Given the fact that HSPs reach the threshold of overstimulation more quickly than non-HSPs (E. N. Aron & Aron, 1997), it was expected that their perceived performance might decrease with an increase in strain. When overwhelmed, HSPs may feel less successful as they might react very emotionally to this overstimulation (E. N. Aron et al., 2012) and, consequently, would not be able to objectively evaluate their own performance. The existing findings contradict this assumption. However, looking at the results in more detail, SPS was found to be the variable that explained the least variance within perceived performance. In comparison, Stress, Anxiety, and Depression, were able to account for more than twice the variance explained in perceived performance. This relatively weak association between SPS and perceived performance might be one explanation for this unexpected result. Given that SPS does not influence perceived performance as much, this does not change in situations of elevated strain and mental ill-health.

By summarizing these underlying mechanisms and characteristics and relating those back to the aspects of openness and uncertainty in the teaching profession, it becomes clear that the basic difficulty is not the uncertainty itself or the HSPs' tolerance thereof. Rather, this openness offers room for flexibility that teachers with high levels of SPS might fill differently. Through certain characteristics that go along with their trait, they invest more time, energy, mental and physical capacity and thoughts to fulfill the teaching role in their own way, dependent on their own personality, are driven by their care and connection with students, and in particular, those who need help. Of course, this openness also implicates risks for mental ill-health in teachers. This is particularly true for HSPs, who are extremely invested in their teaching on different levels and reach the threshold to overstimulation more quickly. This will be the focus of the next section.

9.1.4. Sensory-processing sensitivity can explain the relationship between certain workplace characteristics and perceived stress through underlying cognitive processes and coping.

Considering the results discussed in the previous section, a second underlying similarity can be found across three out of the four aforementioned scales. Except for lack of feedback, all sub-scales stated have been connected to risks for mental health. While a lack of work-life balance and the openness of tasks might directly lead to an excessive work load and, in turn,

not enough recovery and leisure time, this process is more indirect with regard to the scale measuring diverse expectations towards the teacher. Rather, the respective expectations might lead to elevated standards teachers set for themselves, which, consequently, can lead to more time spent to fulfill those expectations.

For example, flexibility in work time can lead to negative influences on performance (Cinamon, Rich, & Westman, 2007) and conflicts between work and family, which, subsequently, lead to a higher risk of burning out (Cinamon et al., 2007). Maintaining a more balanced relationship, however, is particularly difficult for teachers since they have two workplaces, one in the school and one outside of school - often in their homes (Rothland, 2013). But it not just possible family conflicts that can lead to strain in teachers. Not having enough time off work and for recovery also increases the risk of developing symptoms of mental ill-health. In stressful situations, various parts in the body are activated and this stimulation has to be relieved during recovery processes, which then enables rebuilding resources (Sonnentag & Fritz, 2007). Consequently, not enough time for recovery leads to negative consequences with regard to psychological health (Kinnunen, Feldt, Siltaloppi, & Sonnentag, 2011). Leisure has been found to be therapeutic and to improve health (Caldwell, 2005) and to act as a coping strategy to better deal with daily stress (Qian, Yarnal, & Almeida, 2014). It also has been found that recovery might be ineffective if only regeneration, but no Alienation (i.e., distancing oneself from work) or Re-orientation (i.e., preparing oneself for the return to work) is applied as part of the whole process (Lehr, Heber, & Thiart, 2012). Within the teaching profession, alienation also poses a significant challenge. Given that teachers often have two work places and the open-ended tasks, this does not only lead to the risk of more time being spent on these specific tasks, but also to difficulties in distancing oneself from work-related aspects. Additionally, high demands and expectations were found to be associated with mental ill-health (Siegrist, 1996). The importance of resources is apparent in various occupational theories that have been suggested and transferred to the teaching profession as well, such as the Conservation of Resources Theory by Hobfoll (2001), which aimed at integrating stress into the social context. In particular, the theory focuses on resources and suggests that stress is a consequence of a loss of or threat to resources, or a lack of resource gains.

Considering the previous results which showed that HSPs have difficulties maintaining a functional work-life balance, it would be expected that teachers with higher levels of SPS might

be at risk of lacking leisure and recovery time. This may mean that they have problems allocating their time in a balanced way to their work and their personal life. Similarly, as mentioned before, highly sensitive teachers seem to perceive the openness of tasks related to the teaching profession more strongly.

Finally, they were more aware of the diverse expectations and were also more aware of their contradicting findings. All these findings lad to the assumption that HSPs are at risk of investing too much time to work-related topics in their lives and are, therefore, at risk of not getting enough time for recovery, which in turn can lead to poorer mental health (Kinnunen et al., 2011)

Based on these two lines of research, it was hypothesized that the trait of SPS might represent one way to explain how certain workplace characteristics could lead to an increase in perceived stress, which would at least be partially in line with the previously described differential reactivity model (Bolger & Zuckerman, 1995) in which personality influences the relationship between stressors and different outcomes. Importantly, mediation analyses conducted in the present study revealed empirical support for this assumption and further reveal support for the significant role of SPS in line with teacher health research. Specifically, SPS was a significant mediator for the association between the three workplace characteristics (i.e., included in the analyses individually) and perceived stress.

This finding begs the question: What mechanisms might underpin this process?
In addition to the known difficulties of highly sensitive teachers regarding poor work-life balance and their elevated investment in teaching-related tasks leading to the mere problem of the number of hours spent on working and on recovery, there may be other explanations for the underlying mechanisms of this mediating effect. Two of these possible explanations, which have also been represented in the statistical analyses in the present study, are elaborated on in the upcoming two sections.
A general enhanced processing of information, which leads to HSPs to feel overwhelmed and overstimulated more quickly and thus to their higher perception of stress, may be one explanation (E. N. Aron & Aron, 1997). However, despite numerous studies investigating relationships with psychological problems, such as anxiety (e.g., Neal et al., 2002), depression (e.g., Liss et al., 2008) or physical health (e.g., Benham, 2006), the specific mechanisms that

underlie this process are still unclear. Wyller and colleagues (2017) offered a possible resolution through their suggested model which is generalizable to different psychological diagnoses and symptoms. In this model, "*cognitive reactivity*" (p. 4) serves as the possible underlying process and refers to "psychological models of depression development" and "as an important transdiagnostic factor, especially for affective disorders" (p. 4). While deeper processing is assumed to be fundamental for the temperament trait of SPS and therefore, per definition, is not changeable, they suggest that "a secondary reaction" (p. 5), including cognitions and emotions, may comprise the underlying process. Since emotional reactivity was not measured in the present study, the current focus is on the second part of the model in which they state that "cognitive processes might be influenced directly from the amplified sensory signal" (pp. 5-6). In general, they suggest "that it is neither intense sensory information *per se* nor the related negative emotions which cause psychological distress to persist, so much as it is the subsequent, secondary cognitive reactions to them" (p. 6).

As one way to analyze whether HSPs are more prone to such "negative biases in processing" (p. 6), as suggested by Wyller and colleagues (2017), dysfunctional cognitions were also investigated in the present study. Dysfunctional cognitions result in a biased interpretation of situations and can significantly influence emotions and behavior (Beck et al., 1979; Brown & Beck, 2002). In line with this, they have been found to play an important role in the development of depression (Browne, Dowd, & Freeman, 2009; Zingle & Anderson, 1990) in forms of a "cognitive vulnerability" (e.g., Beck, 2008, p. 972) and are, therefore, important to consider with regard to analyses of teacher stress. Similarly, they have been added as an inter-individual difference variable with regard to the onset of mental ill-health in various theories, such as the transactional model of stress and coping by Lazarus (2006) or the model by Wittchen and Hoyer (2011), which originally describes a model within the framework of diathesis-stress framework (e.g., Monroe & Simons, 1991). Various studies have suggested that these cognitions are particularly important for teachers' (e.g., Braun, 2017; Trageser, 2010), and prospective teachers (Kiel, Heimlich, Markowetz, Braun, & Weiß, 2016), particularly with respect to their health (Hillert et al., 2016). Given the diverse expectations teachers face in their work life, it is important for them to realize that it is impossible to fulfill all of them at the same time (e.g., Rothland, 2013). Additionally, having the personal belief that it is important to be liked and accepted by everybody, would be obstructive for teachers in their professional lives.

Based on these three lines of research that reveal the implications of dysfunctional cognitions within the teaching profession, one of the research questions in the present study included the investigation of associations between SPS and various dysfunctional cognitions as an underlying mechanism behind the mediating effect of SPS. Results revealed that highly sensitive teachers in the non-clinical sample were more prone to five of the six dysfunctional cognitions included in the present study: Dependency, Risk avoidance, Depreciation and failure, Avoidance of social support, and Internalization of failure. The only exception was Perfectionism, which did not reveal a significant association with SPS.

However, the developed three sensitivity groups (i.e., low, medium and high sensitive group) were found to differ significantly on all the five sub-scales except Internalization of failure. Regarding Depreciation and failure, the non-parametric statistical test revealed a *p*-value at the threshold of .05, while the parametric analysis was significant. Although all these relationships and differences found had small to intermediate effect sizes, the present study offers important empirical evidence for the hypothesized underlying process described by Wyller and colleagues (2017) and therefore offers important additional evidence for research on SPS.

With regard to the first dysfunctional cognition, Dependency, the association with SPS can be explained through teachers' increased attunement to students, which was described earlier. HSPs were found to be more attuned to students, who are in need of support and help. Teachers' might have thus answered the questionnaire with this awareness of students' needs in mind. Of course, they would like other people to like them, and approve their behavior and their teaching, because they would like to help those students as much as possible.

Risk avoidance, a second sub-scale found to be related to SPS in the present study, has been theoretically linked to HSPs and was now also empirically supported. Due to HSPs' deeper processing characteristic, new and unknown situations are challenging for them, because they cannot access learned behavior or automatic patterns, but rather have to process all details, which leads to a risk of overstimulation (E. N. Aron & Aron, 1997; Homberg et al., 2016). Furthermore, in unknown situations they "pause to check" (E. N. Aron et al., 2012, p. 263) before acting. This characteristic related to SPS (i.e., inhibition of behavior) would be an ineffective behavioral pattern in the school context. This is true despite the general uncertainty in the teaching profession, may it be in the classroom or regarding certain relationship-related

contingencies and antinomies (e.g., Kiel & Pollak, 2011). Consequently, HSPs might tend to avoid these situations and thus avoid being confronted with unpredictable situations and challenges which would be normal for teachers.

Depreciation and failure, which with regard to the analysis of sensitivity group differences only revealed a marginally significant result, and Internalization of failure are the third and fourth sub-scales measuring dysfunctional cognitions. In particular, the focus of these two scales is the tendency of HSPs to attribute both failures to internal characteristics, abilities and weaknesses. Furthermore, these experiences are generalized from one situation to numerous contexts. Due to the research gap in this area, this finding is unexpected and difficult to explain. One possible explanation would be HSPs' high expectations toward themselves and their performance. However, given the lack of statistical significance for the association between SPS and the scale measuring Perfectionism, this is not a suitable justification. Rather, the vulnerability aspect of the trait, which does exist, may be responsible for this result. Supported by significant correlations between SPS and neuroticism (Ahadi & Basharpoor, 2010; Smolewska et al., 2006), which are also related to teacher stress (Mayr, 2014; Smidt et al., 2018), HSPs are more prone to positive and negative stimuli. This finding might also have been elevated due to the aforementioned negative bias of the scale, which is particularly important to consider previous findings suggesting HSPs are more prone "to chronic negative affect" (E. N. Aron et al., 2005, p. 182) in cases of negative experiences during childhood (Liss et al., 2005; Meyer & Carver, 2000). However, as we did not know much about the participants' experiences during childhood or later in life, no more detailed assumptions about this process can be made. It would be, nonetheless, valuable to further investigate this result.

In turn, the non-significant association with the scale Perfectionism is a surprising, but positive finding for the research around SPS. It shows that HSPs might have high expectations for themselves (E. N. Aron, 1997), and reflect on them frequently, as suggested by existing findings (Stefan Lindsay, 2017). But, they do this for their students and their needs and, at the same time, are able to keep them reasonable and realistic. This seems to be true in the context of the teaching profession and can be interpreted as a positive finding.

A final sub-scale that was found to be significantly associated with SPS, is Avoidance of social support. Items assigned to this scale all focused on asking other people for help. Avoiding

social support can manifest as being wary of asking for help for fear that others will perceive them as losers or quitters and as being weak and incompetent. Based on the results, HSPs seemed to have learned this dysfunctional cognition slightly more than non-HSPs. One description of this trait that might help understand this result is that HSPs often feel misunderstood and different (E. N. Aron, 1997), which leads them to "hide a very valuable trait in the classroom" (Stefan Lindsay, 2017, p. 27) as well as in other contexts. Cooper (2015), for example, showed that HSPs do not ask for help and for what it is they would need in order to deal with the expectations and tasks they are given at work. Other findings showed that HSPs tend to avoid social contact more generally (Hofmann & Bitran, 2007; Meyer, Ajchenbrenner, & Bowles, 2005; Meyer & Carver, 2000)

The present findings supported these assumptions. Highly sensitive teachers seemed to avoid asking for help for fear of being perceived negatively. Despite this, their hesitation did not transfer to other contexts such as collaboration in general. For example, additional results from the present study showed that SPS was not significantly related to different forms of collaboration (e.g., Fussangel & Gräsel, 2011). While at a first glance, this seems to contradict HSPs' reluctance to ask for help, this does not seem to be true with regard to professional support as conceptualized with this scale measuring the extent of application of different collaboration forms. Furthermore, when integrating an additional new finding, this is true despite the HSPs' tendency to score higher on the two items measuring different characteristics of the work place with a focus on collaborating with other people, which have been analyzed on the individual item level. For example, the high sensitive group on average reached higher scores on the item "Collaboration with some people is difficult" and "I cannot choose who I work with". Nevertheless, they do seem to collaborate just as much as the non-highly sensitive teacher in the general professional context. Summarizing these findings, it can be said that HSPs might have problems asking for help when it comes to more personal and personality-related aspects and non-professional topics, such as having difficulties managing their work-life balance, but not with regard to professional manners and topics.

In general, findings support the assumption of secondary cognitive processes being responsible for HSPs' propensity for negative mental health outcomes, as suggested by Wyller and colleagues (2017), which is one underlying mechanism explaining the mediating role of SPS on the relationship between certain work place characteristics and stress. Through their negatively biased interpretation of situations, which activate these cognitions, HSPs are more

likely to reflect on these experiences (see also Stefan Lindsay, 2017), avoid social support, and take failure personally. Consequently, this leads to difficulties with alienation and maintaining a balanced relationship between personal life and work, which, in turn, can lead to a risk of decreased psychological health. One possible additional variable that might explain previous findings is rumination (M. S. Robinson & Alloy, 2003). What was described as reflectivity by Stefan Lindsay (2017), may indeed be rumination. It describes the process of thinking situations through over and over again (e.g., Hillert et al., 2016). As this aspect was not included in the present study, this is one research gap that is still existing and should be closed in future studies in order to understand this underlying process more.

The second possible way of explaining this mediating effect is the way HSPs cope with stressful situations. Given their increased risk for over-arousal and overstimulation due to deeper information processing, this seems particularly important for HSPs (E. N. Aron et al., 2012; Greven et al., 2018; Homberg et al., 2016). Furthermore, given the various characteristics that were found to be particularly difficult for HSPs (i.e., as described in a previous section, see section 9.1.3.), this research question becomes more relevant. Therefore, one of the research questions aimed at investigating whether SPS level was related to specific coping strategies. The systematic analysis of those associations fills an important research gap in this area.

SPS was found to significantly correlate with the two sub-scales Resignation and Social withdrawal. While these revealed small effect sizes, the subsequently conducted analysis of group differences revealed intermediate effect sizes that were interpreted as intermediate. Those associations were found in both samples separately. With these results, a two-fold situation becomes apparent: On the one hand, HSPs tend to withdraw from other people more frequently than non-HSPs, prefer to be alone and to avoid social situations. While this scale represented the behavioral aspects, they also tend to resign and give up more quickly, which represents their cognitive processes. Items in this scale asked about feelings of depression and resignation as well as hopelessness. Although these two sub-scales measure reactions on different levels, they still relate to each other to some extent as they both are part of the escape-avoidance coping mechanism as defined by Lazarus and Folkman (1984, 1987).

However, not many studies have investigated different coping strategies and their associations with SPS. Brindle and colleagues (2015) found that a lack of acceptance of unpleasant emotions and of effective emotion regulation strategies mediate the association between SPS and mental ill-health, suggesting one possible explanation for the elevated need for recovery in the work place (Andresen et al., 2017; Evers et al., 2008). In a second study by Stefan Lindsay (2017), a significant percentage of participating teachers mentioned withdrawal as one way to recover from their work load. One participant even planned his daily routine around this need.

These findings support the described differential coping choice model (Bolger & Zuckerman, 1995) that suggests the mediating role of choice of coping strategy on the association between personality and certain outcomes. Furthermore, they are particularly important regarding research on HSPs as deeper processors and their subsequent the risk of overstimulation, which represents one of the major characteristics of the trait (E. N. Aron & Aron, 1997). However, these findings have been mainly interpreted to be dysfunctional (Griffith et al., 1999; Lehr, 2014; Lehr et al., 2008) that are empirically linked to mental disorders such as depression (Orzechowska et al., 2013; Pu et al., 2012), also based on teacher samples (K. Lüdtke, 2017).

The fact that HSPs tended to score higher on the two dysfunctional coping strategies (Resignation and Social withdrawal) than non-HSPs in both samples, the result showing that both samples differed significantly from each other on coping strategies as well as the findings connecting those dysfunctional strategies with an increased risk of developing mental disorders led to one main question: Why are not all HSPs mentally ill?

While a more detailed answer to a similar question will be given in the upcoming section on the comparison between the two samples, three possible solutions that relate less to the clinical context and more to the professional context of teachers, and the trait of SPS itself, are discussed.

One possible answer could be the participants' experiences throughout their lives and during their childhood. HSPs are found to be more prone to chronic negative affect and are more likely to develop mental problems if they were exposed to adversity in childhood (E. N. Aron et al., 2005; Booth et al., 2015). Considering this, the theory of environmental sensitivity (Pluess,

2015) plays a particularly important role. It summarizes various theories, two of which have explicitly investigated the effects of negative childhood experiences (e.g., biological sensitivity to context theory (Boyce & Ellis, 2005); differential susceptibility theory (Belsky, 2005)). Taking this into account, two scenarios may be possible: On the one hand, some HSPs may have had a more adverse childhood than others and may be thus more likely to develop mental disorders later in life. Consequently, only those teachers would also suffer from a mental disorder later in life. On the other hand, it is still not clear among SPS researchers whether childhood is a particular malleable and, consequently, risky time for HSPs. An alternative option would be that experiences later in life also represent particularly risky times. In this regard, it would be imaginable that HSPs, who wanted to be a teacher, but have particular problems with the specific professional environment, might also be more prone to developing psychological problems later in life. A first support of this assumption can be seen based on the higher age in the clinical sample compared to the non-clinical sample.

The second possibility is connected more to the working context. Highly sensitive teachers perceive so much reward from their professional function and their attunement to their students (see section 9.1.2. and the findings by Stefan Lindsay, 2017) that it may outweigh related challenges. This is in line with research suggesting that teachers who perceive to have a good relationship with students to experience more positive emotions (Taxer et al., 2018). Those, in turn, can act as a preventive mechanism for emotional exhaustion and negative affect (Taxer et al., 2018) as well as a rehabilitator (Tugade & Fredrickson, 2004). Furthermore, positive affect was found to relate to job satisfaction (Bracket et al., 2010), further explaining why highly sensitive teachers stay in the profession. Given the recently increased focus on positive effects of positive experiences (i.e., in line with the theory of vantage sensitivity, Pluess & Belsky, 2013), this is also a reasonable interpretation for this finding. Commitment to students was also one strategy Stefan Lindsay (2017) found in her study on highly sensitive teachers. A significant percentage of highly sensitive teachers who participated in her qualitative interview mentioned this as an effective way to cope with everyday life challenges they face in school. The importance of relationships between teachers and students with regard to psychological well-being has already been investigated in line with emotion research as well (Spilt, Koomen, & Thijs, 2011). Emotional exhaustion, for example, has been found to be negatively related to perceived connectedness with students (Klassen et al., 2012). Taxer et al. (2018) further revealed evidence for the fact that this association was mediated by the perception of

enjoyment. Therefore, it can be assumed that for HSPs, given their strong connection to their students and general elevated emotional reactivity, this may give them more enjoyment and a higher reward than non-HSPs.

A third explication can be the assumption that there is a certain percentage of people, for whom specific coping strategies are better than for others. For example, Connor-Smith and Compas (2004) found that individuals who are more sensitive to threat might benefit from disengaging as one coping strategy, while this might not be true for others. Given that one core characteristic of SPS is the risk of overstimulation (E. N. Aron & Aron, 1997), this pattern might also be transferrable to people with high levels of SPS. Social withdrawal in psychological research often implies a lack of social interactions. This is also true for the professional context, in which social interaction is often seen as an external resource (Hobfoll, 2001). However, social withdrawal might mean something very different for HSPs who might use it to avoid or to recuperate from overstimulation (E. N. Aron et al., 2012; Homberg et al., 2016), which does not necessarily mean that they do not engage in social activities any more.

As a final note, self-efficacy (Bandura, 1994) has been found to be important for coping behavior (e.g., Lazarus, 2006). In particular, the beliefs about one's own abilities in challenging situations is important as they can influence whether one feels he or she has the capacity to act competently. Similarly, self-efficacy has been found to be inversely related to stress (Smidt et al., 2018). Furthermore, lower perceived control over characteristics of the work place was found to be significantly positively related to burnout (Tuettemann & Punch, 1992). While a previous study on SPS did not find an association with self-efficacy (Stefan Lindsay, 2017), the present study's results did: A small negative significant relationship between SPS and self-efficacy suggested that HSPs feel less self-efficious. Based on general characteristics of SPS and considering the described influence of early life events, HSPs' sense of self-efficacy might develop based on their experiences throughout their lives, during their childhood and afterwards, continuing additionally during their professional lives. Therefore, the more negative and challenging experiences they may have had, particularly at younger ages when their coping and reflective abilities were less developed, the less self-efficious they may feel later in life. Repeated experiences of failure to cope with particularly stressful, challenging and overstimulating experiences, might be learned especially quickly and permanently by HSPs given their deeper information processing and stronger emotional reactions – two

characteristics that have also been found to enhance learning (e.g., Bower, 1992; Kensinger & Schacter, 2016; Tyng, Amin, Saad, & Malik, 2017).

9.1.5. Teachers in the clinical sample are more sensitive on average than those in the non-clinical sample.

Another main interest in this study was the comparison between the non-clinical and the clinical sample in three ways: The mean scores from the HSP scale were compared between both samples, three sensitivity groups were created based on the data of the non-clinical sample and subsequently transferred to the clinical sample, and the resulting six sensitivity groups were also compared to each other.

The findings described in this section suggested that the mean scores on the HSP scale were generally higher in the clinical sample than the non-clinical sample. Because this study is the first to systematically compare two samples regarding SPS and its possible underlying mechanisms, these results significantly contribute to research on SPS and the understanding of its association with mental illness. However, this also means that he results cannot be discussed through the lens of existing findings. Rather, hypotheses regarding the underlying process are made.

In general, these results are not surprising given the increased depth of processing characteristics found in HSPs which leads them to reach overstimulation more quickly, and, consequently, puts them at a higher risk of mental ill-health (E. N. Aron & Aron, 1997). However, as SPS does not represent a mental disorder or mental-health problem itself (E. N. Aron & Aron, 1997), previous findings (for an overview, see Wyller et al., 2017) and those in the present study (see chapters 8.2.3. and 8.2.1.1.) which revealed small correlation coefficients between SPS and health-related variables, and the findings with regard to the mediating role of SPS with regard to teachers' stress described above (see section 9.1.4.), the trait itself may not directly lead to the development of mental illness, but rather some underlying mechanism that varies among individuals may be at play (Wyller et al., 2017). Therefore, while certain characteristics of the work place that might lead HSPs to be overwhelmed more quickly have been discussed in a previous chapter (see chapter 9.1.3.), the upcoming discussion of results focuses more on possible clinical and health-related aspects that might help explaining this difference.

One possible explanation could explore "whether SPS is a stable trait across development, or whether certain experiences lead to changes in levels of SPS" (Greven et al., 2018, p. 19). Given the assumption that levels of SPS might be malleable also later in life, it might be expected that participants in the clinical sample who presented with clinical diagnoses and were being treated during the study, might have experienced extreme and bothering or traumatic incidents and experiences, which could have changed their level of SPS. However, the results of the present study did not reveal a significant relationship between sensitivity group and diagnoses. Rather, the most frequent diagnosis of participants was related to a depressive disorder, while the secondary diagnoses included somatic problems, which is not surprising given the clinic's specialization in psychosomatic health problems. Despite the non-significant relationship between diagnosis and sensitivity group, and further contrary to the assumption above was the fact that the one diagnosis of posttraumatic stress disorder was found in the low sensitive group. This assumption can therefore be seen as not being able to hold as a mechanism explaining this difference. However, it might still be worth further investigating these associations in further studies as the present one only represents a preliminary analysis.

A second possible explanation in this direction, suggesting certain work place characteristics to represent experiences that might have changed levels of SPS can be seen as not supported by the present study, as demonstrated in the previous section.

A third explanation that could have led to this difference in SPS across samples and sensitivity groups are the patients' conditions and environments at the time of data collection. During their inpatient treatment, patients (i.e., participants in the clinical sample) pay specific attention to their perceptions, senses and well-being and, as a consequence, might perceive those sensations more strongly. The therapeutic program AGIL ("Work and health in the teaching profession"; Hillert et al., 2016), a program that has been found to be effective (K. Lüdtke, 2017), aims at supporting teachers by helping them cope with work-related stress. It was developed by researchers working in the Schoen Klinik Roseneck based on empirical findings on the differences between healthy and mentally ill teachers, and is regularly offered for teacher patients, including those who participated in the present study. One module in this manual, for example, includes the identification of individual reactions to stress and sufficient time of relaxation. Related exercises and elements of psychoeducation might have led to teachers in

the clinical sample to focus more on these certain aspects in their personal and work life. In turn, this might has led them to agree more with all the items in the HSP scale. Furthermore, it might have even affected patients' interpretation of their previous experiences within the teaching profession as more overwhelming in retrospect.

A final possible explanation goes back to previous findings on underlying dysfunctional cognitions and coping strategies and the model by Wyller and colleagues (2017), suggesting that the secondary processes related to SPS might be malleable, "depending on a range of different factors within the individual (e.g., social context, sensory stimuli, circadian rhythms)" (p. 2). However, this model advocates a two-fold mechanism: On the one hand, they suggest that the association between SPS and physical health problems found in a previous study by Benham (2006) can be explained by the fact "that HSPs are more sensitive to and aware of somatic sensations, paying attention to minor physiological sensations which others may not notice" (Wyller et al., 2017, p. 3). This would support previous theoretical assumptions of HSPs having more awareness of internal and external stimuli (E. N. Aron & Aron, 1997). However, particularly important for the present study is their statement with regard to "a possible link between SPS and conditions that are often understood as 'functional' or 'psychosomatic' in the medical literature" (Wyller et al., 2017, p. 3). One reason for the higher levels of SPS being found in the clinical sample is their increased awareness to their bodies and related sensations. This could explain not only the unequal distribution of sensitivity groups across the two samples, but also their secondary somatic diagnoses. However, the present study is not able to support this assumption empirically. Future studies should therefore test this hypothesis through conducting studies in other clinics, which have a focus that is not psychosomatic, and further analyze the hypothesized increased awareness for somatic stimuli in more detail.

However, what the present study has found evidence for is the second aspect suggested in the model by Wyller and colleagues (2017): The underlying enhanced cognitive reactivity in HSPs. The associations between dysfunctional cognitions and SPS as well as the influence on teacher stress resulting from this relationship has already been described in detail in a previous section (see chapter 9.1.4.), therefore, it will not be explored further here.

Nonetheless, these findings can help explain the difference between the levels of SPS across the samples. This is true when taking other results together as well: While the two samples differed significantly on all six sub-scales measuring dysfunctional cognitions, the two high sensitive groups only differed on two dysfunctional cognitions: Internalization of failure and Depreciation and failure. Relating those findings back to the previous results (see section 8.2.4.1.), those two were also found to be related to SPS. The summary of these findings leads to preliminary evidence for the two dysfunctional cognitions Internalization of failure and Depreciation and failure play an important role in predicting whether HSPs develop a mental disorder.

A similar result was found when analyzing different coping strategies. While the two samples differed significantly on all sub-scales, supporting previous findings (e.g., Lehr et al., 2008), the same was true when comparing the two high sensitive groups to each other on these scales. However, only Resignation and Social withdrawal were significantly related to SPS. Taking these findings together, coping strategies might also play an important role in differentiating whether HSPs are more prone to mental illnesses or not. However, given their need for breaks and sufficient time to recover from overstimulation as basic needs (E. N. Aron & Aron, 1997), future studies have to first determine whether those strategies really are dysfunctional for them and whether it goes along with decreased social interaction.

9.1.6. Sensory-processing sensitivity relates to teachers' depression, anxiety, and other psychosomatic disorders.

While numerous studies have investigated the association between SPS and various variables of mental ill-health (Greven et al., 2018), a systematic analysis of SPS in the clinical context has not been conducted to this day. In order to close this research gap, another research goal of the present study was to investigate whether SPS might relate to certain diagnoses in the clinical context. To answer this research question, associations between sensitivity group and main and secondary diagnoses were analyzed. However, due to the limited number of participants data were available for, the originally three sensitivity groups were summarized into only two sensitivity groups, namely high and low sensitive group. While across samples the most common diagnoses were related to depressive disorders, no statistically significant association between sensitivity group and main diagnoses was found in the present data. However, preliminary evidence was found when analyzing the data on a descriptive basis: The two main

diagnoses describing a severe depressive episode and the recurring depressive disorder with a severe episode were only found in patients from the high sensitive group. Furthermore, affective disorders, including phobic and anxiety disorders, were also found more in the high sensitive group. On the other hand, other diverse diagnoses were more common in the low sensitive group, including obsessive-compulsive disorders and posttraumatic stress disorders to just name a few.

The situation regarding to the secondary diagnoses was more difficult and complex as there were multiple secondary diagnoses for most patients. However, when considering the three most frequent diagnoses, a first pattern emerged: In particular, slightly more diagnoses of hypertension and tinnitus were found in the high sensitive group. A similar tendency was found for somatoform disorders. However, it is important to note that the differences regarding the frequency were small.

These findings can be further supported and expanded when looking at the associations between SPS and additional measures of psychological ill-health common in the clinical context. In particular, the BSI-sub-scales of Interpersonal sensitivity, Depression, Anxiety, Phobic anxiety, and the Positive symptom distress index revealed a significant association with SPS at admission and at release. Furthermore, the BSI sub-scale of Obsessive-compulsive behavior, Somatization, Hostility, the Global severity index and the Positive symptom total were significantly related to SPS only at admission. In addition, patients' scores on the PHQ sub-scales measuring Depressive and Anxiety disorder were significantly related to SPS at admission, but not at release. All effect sizes were weak to moderate with the biggest effect found with Depression, Anxiety, Phobic anxiety, all sub-scales of the BSI, and Anxiety disorder as measured by the PHQ.

These results were further brought into focus by an analysis that investigated the association between the two sensitivity groups in the clinical sample and indicators of severity (i.e., a T-score above 63 on the BSI sub-scales as defined in the manual). In particular, a significant association was found with regard to Obsessive-compulsive behavior, Depression, Phobic anxiety and the Global severity index in that relatively more patients in the high sensitive group reached T-scores above the threshold than in the low sensitive group. Similarly, the opposite

also was true: Relatively more patients in the low sensitive group reached scores below 63 than in the high sensitive group.

Integrating these findings reveals evidence for the prevalence of two broader mental disorders associated with SPS: anxiety and depression. Because of the focus of the collaborating clinic, which was psychosomatic in nature, psychosomatic disorders were, of course, also relevant in the present study. It further supports existing results, suggesting a specific association between SPS and anxiety (e.g., Meredith et al., 2016; Meyer & Carver, 2000; Neal et al., 2002), depression (Brindle et al., 2005; Konrad & Herzberg, 2017; Liss et al., 2008; Yano & Oishi, 2018), and physical symptoms (Benham, 2006).

Based on the previously discussed importance of dysfunctional cognitions (see section 4.3.1.2.), which indicated the importance of underlying cognitive processes, the association with depression is not surprising. In the model of depression by Beck (2008), for example, dysfunctional schemas play a central role. Defining it as cognitive reactivity, Wyller and colleagues (2017) transferred this process to the mechanism behind the association between SPS and psychological problems.

On the other hand, the only theoretical assumptions about the underlying processes behind the relationship between SPS and anxiety was also suggested by Wyller et al. (2017), who hypothesized that their model is also applicable to anxiety disorders. This is in line with various models of anxiety, which also focus on the role of information processing in its development (e.g., Beck & Clark, 1997; Beck et al., 1985). In addition, strong emotional reactions have also been related to the onset of anxiety through learning and conditioning processes. Accepted theories further suggest that personality traits, such as (behavioral) inhibition, influence this process and might lead to an increased risk of developing anxiety disorders (e.g., Barlow, 2002). This is particularly important with regard to SPS since behavioral inhibition is one theory the construct was based on (e.g., E. N. Aron & Aron, 1997; E. N. Aron et al., 2012). Similarly, people who are more prone to negative affect through their temperamental nature might learn more strongly from one incident and are, therefore, at higher risk of developing anxiety disorders than those individuals who perceive negative affect less saliently (e.g., Barlow, 2002). Furthermore, models suggest the moderating role of emotion regulation after the learning or conditioning process for the onset of stress (e.g., Cisler, Olatunji, Feldner, &

Forsyth, 2010). The importance is further enhanced through the fact that teachers only have "limited options for self-regulation" (Jennings & Greenberg, 2009, p. 497) in their everyday work life. If emotion suppression is applied frequently (i.e., as one of the options teachers have in their everyday school life), this has been found to have consequences on the experienced emotions in that they are more negative (Gross & John, 2003), which leads to an increased likelihood of experiencing negative affect (e.g., Zapf, 2002).

For all these aspects, research on SPS has already revealed empirical support. For example, in addition to the numerous studies that have investigated associations with negative affect and variables of psychological ill-health (for an overview, see Greven et al., 2018), Meyer, Muriel, and David (2005) and E. N. Aron and colleagues (2012) found SPS to be positively associated with affective reactions. Furthermore, emotion regulation strategies have also been found to partially mediate the relationship between SPS and depression (Brindle et al., 2015). Whether this is also true for anxiety disorders cannot be investigated in the present study as no data on emotion regulation were collected. However, this would be an important open research question that future studies should explore.

In general, the described findings further support the theoretical assumption that characteristics related to SPS are rather "transdiagnostic" (Wyller et al., 2017, p. 4) than bound to a specific diagnosis. In particular, the present study further supports the theory that emotional and cognitive processes might represent underlying processes behind the positive relationship between SPS and mental ill-health, with a focus on depression and anxiety. Results that this process may also apply to psychosomatic problems are evident in this study based on the clinical data set, which further reinforces a previous study by Konrad and Herzberg (2017) conducted with healthy individuals. The authors found an association between SPS and somatization that is comparable to those found with hostility or obsessive-compulsive behavior.

As a final note, it is important to state that for some scales the association with SPS was only significant at admission and not at release for the clinical sample. Whether this can be interpreted as preliminary evidence in support of the vantage sensitivity framework will be the focus of the following section.

9.1.7. Highly sensitive teachers benefit more from therapeutic interventions than non-highly sensitive teachers, particularly regarding their most common mental disorders.

Another main goal of the present study regarding clinical data and its related research questions, it was of interest whether HSPs benefit more from therapeutic interventions than non-HSPs. The reason for this was the recently increased focus on positive effects of SPS (e.g., Pluess, 2015). While previous studies have investigated the benefit of participating in a depression prevention program (Pluess & Boniwell, 2015) and an anti-bullying intervention program (Nocentini et al., 2018) based on an adolescent samples, no studies have been conducted with adult samples or in a clinical context. The present study therefore significantly contributes to the research field on SPS and the theory of vantage sensitivity (Pluess & Belsky, 2015).

This research question was answered in three different ways: First, it was investigated by analyzing the correlations between SPS and patients' difference scores (i.e., between admission and release), which revealed significant results for the BSI sub-scales of Obsessive-compulsive behavior and Phobic anxiety as well as the PHQ sub-scales of Depressive disorder and Anxiety. Second, the association between membership in a sensitivity group and CGI (i.e., Clinical Global Impression) improvement score was analyzed, but did not reveal a statistically significant result, indicating no association. In a third step, the previously applied thresholds of the BSI sub-scales were applied and it was analyzed whether the sensitivity group that patients were assigned to was significantly associated with whether they reached a below-threshold score upon release from treatment (while at the same time, having reached a score above the threshold at admission). Although the statistical test did not reveal a significant result, a first tendency was found in line with the assumption in a way that the high sensitive tended to improved slightly more. Nevertheless, across sub-scales, the majority of patients did not change significantly (i.e., based on the definition of the research question, which defined no change as the same score at admission and upon release, independent of whether the score was above or below threshold. The fourth step included analyzing the GAF (i.e., Global Assessment of Functioning) dichotomized difference scores, which would indicate either a decline or an improvement in patients' functional level. Results revealed a similar distribution of these difference scores across sensitivity groups.

In addition, the analyses comparing the sensitivity groups to each other were applied again based on the sensitivity groups created on the basis of the clinical data. The results shifted towards fewer associations reaching statistical significance. For example, the relationship between SPS and the difference scores on the PHQ sub-scale anxiety was the only difference still reaching significance.

In general, it can be said that all patients, independent of their membership in a certain sensitivity group, improved regarding their general functioning and regarding their clinical global impression throughout their stay at the clinic. While this is indicative of general therapeutic treatment success, some differences relevant to SPS appear when looking at individual mental disorders. In line with the theory of vantage sensitivity (Pluess, 2017; Villiers et al., 2018), a general tendency toward HSPs benefitting more from the respective clinical interventions was found with regard to most mental disorders. Specifically, it was found that patients with high levels of SPS improved significantly more regarding Depression, (Generalized) anxiety, Phobic anxiety, and Obsessive-compulsive behavior. Although the effect sizes were small for all scales, the biggest effect was found with regard to anxiety. This was further supported when considering the three newly created sensitivity groups (i.e., based on the data and distribution of the clinical sample).

These results have two main effects: On the one hand, they further support the important role of anxiety disorders in SPS, which was described in detail in previous sections. On the other hand, they also reveal new evidence for the fact that the respective treatment works particularly well for HSPs, further adding systematic clinical empirical evidence in support of positive effects of positive experiences for HSPs and, consequently, in support of vantage sensitivity (Pluess, 2017; Villiers et al., 2018), closing one important research gap in the field of SPS research (Greven et al., 2018). At least with regard to these sub-scales, the variability in improvement might be due to people with higher levels of SPS (Villiers et al., 2018).
Based on previous findings (e.g., Pluess & Boniwell, 2015), which showed that children with high levels of SPS reached significant improvements in their symptoms up to 12 months after the assessment, it would be expected that this improvement would be even stronger if conducting a follow-up investigation after a certain amount of time. This might even transfer to those mental disorders HSPs have not been shown to improve on yet. One reason might be that some interventions focus on behaviors that might take longer to learn and apply, such as

physical activity or restructuring cognitive biases, including dysfunctional cognitions. Future studies should therefore take this aspect into consideration.

However, one partially surprising finding in this regard was the lack of statistical significance of the difference between the sensitivity groups on the improvement scores (i.e., the difference between the scores at admission and upon release) of the sub-scales measuring Depression, Phobic anxiety and Obsessive-compulsive behavior. The only significant different found was on the PHQ sub-scale measuring Anxiety. The reason behind this finding might be the highly uneven distribution of the three sensitivity groups in the clinical sample. Based on the determination of the cut-off-scores on the basis of the non-clinical data and the significantly higher scores on the HSP scale in the clinical sample leads to more patients in the clinical sample being declassified as HSPs. This leads to statistical limitations and might be the reason for the non-significant results. With regard to the PHQ scale Anxiety, the discrepancy regarding the difference in patients' T-scores was especially high (i.e., the high sensitive group reached difference T-scores of almost twice as much as the low sensitive group), which could have led to another statistical challenge.

However, when looking at the newly developed sensitivity groups (i.e., based on the clinical sample) as a possible solution to the aforementioned problem, the results did not change and only differed with regard to the PHQ sub-scale Anxiety. Again, the reason for this might be statistical. Although the sensitivity groups in this case followed a more even distribution and differed regarding SPS, they were still relatively close together (i.e., closer than in the non-clinical sample) and were skewed with regard to SPS, but also in the severity of their mental disorders. This might result in a limitation of variance, which would, consequently, influence the result of the statistical test. Additionally, the groups differed significantly on the BSI-scales of Phobic anxiety, Obsessive-compulsive behavior and the PHQ sub-scale Anxiety when controlling for length of stay, only the BSI sub-scale Depression remained insignificant. Those findings reveal further support for the significant role of length of stay for analyses in the clinical context on improvement scores and should be investigated in future studies.

Another interesting finding is the improvement with regard to Obsessive compulsive behavior (i.e., OCD) in HSPs despite it not being a frequent diagnosis for this group. Rather, only a few patients in low sensitive group had this diagnosis in the present study. However, although the

only indication in this regard was the significant correlation between SPS and the difference scores, a difference between the two original sensitivity groups on this sub-scale was already found as part of a previous research question, leading to the assumption of some importance of this variable for SPS. No study on SPS, thus far, has investigated SPS in the context of obsessive-compulsive disorder. The underlying mechanism is therefore only hypothetical. One possibility is the recent findings showing associations between obsessive-compulsive behaviors with scales of the Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990). In particular, OCD patients on average scored higher on the scales of Concern over mistakes, Doubts about action, and Parental criticism than participants in the control group (Lee et al., 2009). Findings regarding how HSPs deal with uncertainty and flexibility as work place characteristics, which are described in a previous chapter (see section 8.2.2.), taken together with their general characteristics (E. N. Aron & Aron, 1997; E. N. Aron et al., 2012), could explain these results. Additionally, given their improvement with regard to Anxiety and Depression described above, these learning processes might have had an effect on some of the symptoms of OCD as well, further explaining why HSPs improved on this BSI sub-scale.

9.1.8. Highly sensitive teachers ≠ highly sensitive teachers – first exploratory evidence for the existence of different sensitivity types.

One of the final open research questions aimed to further investigate whether HSPs also differ from each other. Based on the variety of characteristics found to be associated with SPS, and the fact that they did differ from each other regarding how to perceive and deal with challenges and stressful situations, it would be reasonable to assume that there might be differences among HSPs. The question at this point is whether those different types might be indicated by their answering patterns on the HSP scale (Wyrsch, personal communication, September 19, 2018). In particular, it was hypothesized that the facet Aesthetic sensitivity (i.e., AES) might represent one indicator for vantage sensitivity. The extraction of three sensitivity types, which are relatively similar in size, were found to represent the data best: The Excitable HSPs with a tendency toward a low sensory threshold, the Aesthetically-focused HSPs, and the Generally high scoring HSPs (across facets). As can be inferred from the clusters' names, two emphasized different aspects of the HSP scale, while a third group of HSPs reached elevated scores across all facets. One interesting finding was the distribution of samples across clusters: While the majority of the clinical sample was assigned to the second cluster (i.e., the Aesthetically-focused HSPs), Cluster 3 (i.e., the Generally high scoring HSPs (across facets)) included a

similar majority of the non-clinical sample. This distribution indicates that the hypothesis of AES representing a protective factor was not supported in this study. Rather, it seems that the opposite might be true.

Interesting and illustrative findings were revealed when investigating the differences between the sensitivity types on the additional psychological variables included in the study, all of which have been described in previous sections. In particular, the types were found to differ significantly from each other on the measures of work-life balance, self-efficacy, and all dysfunctional cognitions and coping strategies found to be significantly related to SPS. On the contrary, no statistically significant findings were found regarding the remaining workplace features or the two newly developed scales connecting characteristics of SPS with the teaching profession. Across all these dimensions and scales, Aesthetically focused HSPs reached scores that are interpreted as most positively: They were more self-efficious, had a better work-life balance, and applied dysfunctional cognitions and coping strategies less frequently. Clusters 1 and 3, on the other hand, alternated with regard to which one reached the highest scores across scales. Taking this into account, the findings fell more in line with the original hypothesis, suggesting AES is a positive facet of SPS.

However, at first glance, these two major findings seem contradictory in combination: Cluster 2 showed the most functional cognitions, coping strategies and work-life balance, but at the same time included a majority of participants with a clinically relevant disorder.

This can be explained based on the clinical context. Patients treated in the clinic have been there for an average of almost 50 days, which means that they have already received treatment and therapeutic interventions. Therefore, these individuals may be able to learn and process the changes more qickly and implement new behavior and cognitions at the time of the study. Furthermore, the clinic represents a safe and self-contained setting that may make these change processes easier. The opposite clusters, on the contrary, have their elevated scores on items measuring LST (i.e., Low sensory threshold) and EOE (i.e., Ease of excitation), both aspects leading to an easy overstimulation, in common (Smolewska et al., 2006). In support of this, existing empirical evidence also shows a significant association between these two facets and subjective health complaints (Grimen & Diseth, 2016). Similarly, AES was not found to relate to health complaints and neuroticism a finding that falls in line with the present study's suggestion that AES is "the more positive aspects of being a highly sensitie person" (p. 3).

However, an additional important result was the non-significant difference on therapeutic success between the clusters. As was the case for some of the previous findings, this is assumed to be mainly due to methodological and statistical issues. Since the additional clinical data (including the measures of therapeutic success) was available for only a certain percentage of patients, these groups were significantly different in size with the second group being much smaller. This may have led to a statistical result that was biased and not generalizable. It would be useful for future studies to explore this aspect of SPS (i.e., AES) in relationship with therapeutic outcomes more closely.

9.1.9. In addition to other variables, sensory-processing sensitivity can contribute significantly to the development of teacher stress – a tentative, overarching model.

The final aim of the study was to develop a model to explain the development of occupational stress in teachers by including all variables that have been found to play an important role with regard to SPS in previous analyses, and the theoretical models most common in the teaching professionalism research. The fact that the fit indices did not support the model fit to the present data set might be explained by two aspects: On the one hand, the sample size might have been too small for the number of paths included in the mode. On the other hand, due to the small sample sizes, both were taken together to investigate the model fit. However, looking at the descriptions and results above, they differed significantly on variables that have been found to be important for the onset of teacher stress. Therefore, some effects may have overridden each other.

Nonetheless, the standardized regression weights for this model indicated the relative importance of SPS in this complex process. In particular, the associations between SPS and perceived stress were relatively strong compared to those of the remaining variables. Furthermore, when not including self-efficacy into psychological factors, SPS was also strongly related to this particular facet. The resulting regression weight for this association reached a score that was the same as the one revealed for the association between psychological factors and perceived stress. In summary, it can be seen that SPS plays an important role within the complex process of stress development in the teaching work place.

9.2. Practical and Scientific Implications

As a result of the nine key findings discussed above, various conclusions can be deducted. The four main practical implications are described in the following sections. They include one implication for research on teachers (chapter 8.2.1) and SPS (chapter 8.2.2), one implication that focuses on HSPs, their characteristics and important environmental considerations (chapter 8.2.3.), and a fourth that focuses on implications on clinical interventions (chapter 8.2.4).

9.2.1. Scientific implications for research on teacher professionalism and stress.

One of the two main implications of the present study are for research on teacher professionalism and stress. Based on the theoretical and empirical approaches that built the framework of this study, SPS was found to play an important role in almost all of them. The following two sections will describe these associations separately for both lines of research.

Regarding teacher professionalism and the three related approaches included in the present study, results support significant implications for all of them:

- Structural-theoretical approach: Results of the present study revealed that teachers with high levels of SPS perceived various work place characteristics differently. In particular, this pertained to those characteristics that contain a relatively high level of openness and flexibility. Based on the discussion of the results in the previous section (see chapter 9.1.), this perception relates back to highly sensitive teachers' difficulties with deciding on how much effort and time to spend on a particular task, which, in turn, can be attributed to their interest in students in need, as well as their high need for reflection. When considering these findings and the basic characteristics of the structural-theoretical perspective of the teaching profession, various overlaps can be found. In particular, when looking at the underlying uncertainty of educational action (e.g., Kiel & Pollak, 2011), which can be interpreted as an overarching asset which combines the different aforementioned open tasks. Given that the main goal of teaching is "getting pupils to learn" (Husén & Postlethwaite, 1994, p. 6136), which can be measured by student performance, it can be assumed that this uncertainty might pose a significant challenge particularly for highly sensitive teachers. Given the students' (and their characteristics, including cognitive abilities and motivation, etc.) significant role in this process (Dewey, 1993; Helmke, 2007, 2009), teachers can never rely on a direct effect of teaching on learning. Similarly, the interrelations between their own expectations and other people's expectations (e.g.,

Luhmann, 2004) have been found to be more salient for highly sensitive teachers. A similar relationship can be found when considering the different antinomies that teachers face in their school environment (e.g., Helsper, 1996, 2004) which often contradict each other. One antinomy that, based on the results of the present study, might be especially difficult for teachers with high level of SPS is the antinomy of proximity (Helsper, 2002), which states that teachers have to be close and responsive to students, but simultaneously remain objective or neutral. Because results suggest that highly sensitive teachers feel attuned to their students in need, the distancing aspect of the profession might be demanding for them since HSPs' value purposeful work (E. N. Aron, 1997 which may come from feeling close to and being supportive of their students.

- Connections with SPS and related characteristics can also be found in the competence-oriented approach. In addition to knowledge and skills, which are suggested as being important "in order to meet the demands of their profession" (Baumert & Kunter, 2013, p. 26), motivational orientation and self-regulation are also interpreted as essential in the teaching profession. Regarding to motivational orientations, the deeper meaning that is important for highly sensitive teachers, and their higher perceived attunement to the students in need is worth mentioned again (E. N. Aron, 1997). Those two aspects might represent one general motivation for HSPs to become teachers. Despite the fact that some work place characteristics might represent a challenge for them, their enthusiasm and interest in their students' development (see also Stefan Lindsay, 2017) might be even higher than that of teachers with lower levels. As mentioned before, this overarching goal might even act as a protector and carry them through difficult times. However, self-regulation skills represent another challenge for highly sensitive teachers. Self-regulation includes "the ability to responsibly manage one's personal resources" (Baumert & Kunter, 2013, p. 40), which relates to various results of the present study and existing findings associated with SPS. First, self-efficacy was negatively related to SPS in the present study. Given its relationship with strain (I. A. Friedman, 2003), which was also supported in this study, highly sensitive teachers do show a risk of having difficulties in this regard. Another aspect of self-regulation is the "ability to regulate their psychological experience" (Baumert & Kunter, 2013, p. 39). Emotion regulation skills have been found to influence the association between SPS and mental ill-health (Brindle et al., 2015) and, therefore, represent another aspect of difficulty for highly sensitive teachers. However, the positive effects of positive experiences and emotions for teachers with higher levels of SPS might aösp play a role,

given that those are also part of the experience in the school context. In addition to the fact that highly sensitive teachers might benefit particularly from the training of these skills in order to better cope with related challenges, their attunement to students and greater need for meaning in their work might also be perceived stronger by teachers with high levels of SPS, which in turn can positively enhance "work engagement …, and work-related emotions" (Baumert & Kunter, 2013, p. 40).

- The personality approach, as a final theoretical approach, represents the basic approach into which SPS can directly be integrated. In particular, this approach investigates the effects of certain personality traits on certain aspects of the teaching profession. Not just based on the previously discussed findings with regard to highly sensitive teachers' perception of work place characteristics the investigation of SPS within the personality approach would be not only suitable, but also gainful. Also, empirical evidence for the interrelations with other traits, such as the Big Five personality traits and particularly neuroticism and introversion (see chapter 3.5.; e.g., E. N. Aron & Aron, 1997) and the general conceptualization of the trait as a genetical determined and stable temperamental trait makes it important to be considered as well. Furthermore, the aforementioned associations with self-efficacy, or tolerance of uncertainty (König & Dalbert, 2007) are two aspects that can be assigned to the context of this approach and are at the same time highly related to SPS.

The second line of research for which significant connections with SPS are found is that of teacher stress and related psychological theoretical and empirical models that have been developed to understand its onset. In addition to the existing associations with negative affect (particularly with anxiety and depression; see chapter 3.7.) found in previous research and in this study, the especially popular and highly relevant models regarding SPS are as follows:

- Diathesis-stress model: In line with this model, certain characteristics represent vulnerability factors that might increase the risk of developing certain mental disorders (e.g., Monroe & Simons, 1991). Although it has been criticized recently (e.g., Pluess, 2015), this approach was also applied to research on SPS. However, given the recent focus on positive effects of positive experiences in line with the theory of vantage sensitivity (Pluess, 2017), this approach alone does not seem to be suitable for SPS. A more suitable approach uses the model by Wittchen and Hoyer (2011) as it combines certain aspects of the transactional model, which have also been linked to SPS and is described subsequently, into their interpretation of the diathesis-stress framework. Furthermore, they also take the

social environment of an individual into consideration regarding the onset of psychological ill-health, which is also highly important with regard to SPS and the overarching framework of environmental sensitivity (Pluess, 2015). How SPS relates to these processes is explained in more detail in the upcoming section.

- The transactional model of stress and coping focuses more on the widely-variable individual perceptions of situations (e.g., Lazarus & Folkman, 1987). In particular, this theory focuses on the various ways in which personality-related characteristics and their related coping mechanisms can influence stress (e.g., Lazarus, 2006). One important aspect is that of dysfunctional cognitions (e.g., Brown & Beck, 2002) as well as self-efficacy (e.g., Bandura, 1994) both of which have been found to be significantly associated with SPS in the present study. In addition to the Big Five, which have been analyzed in line with specific coping strategies (e.g., Gunthert et al., 1999), Bolger and Zuckerman (1995) suggested different models explaining the mechanisms of personality traits, stress and coping. Out of numerous models, the present study supported the differential coping choice model (p. 892) such that highly sensitive teachers chose coping strategies that are generally interpreted as dysfunctional in the research field. Furthermore, a recent theoretical framework (Wyller et al., 2017) suggests underlying cognitive reactivity processes to be responsible for the association between SPS and certain mental ill-health. Through empirical support for significant relationships between SPS and dysfunctional cognitions, this model was partially supported in the present study, which, in turn, reveals partial preliminary support for the suggested differential reactivity model. Although this association must still be supported in future studies, it is reasonable to assume that highly sensitive teachers might show increased reactivity to stressors, which, in turn, might lead to an increase negative effect in line with health-related outcomes.

Summarizing the connections between the evidence for the temperament trait of SPS and different scientific approaches to teacher professionalism and health, SPS can be interpreted as a personality-related trait that is not just suitable for the integration into both lines of research but might also help gain more insight into the relevant underlying mechanisms.

9.2.2. Scientific implication for research on sensory-processing sensitivity.

The present study contributed significantly to two major research gaps for research on SPS, which included the workplace and aspects of mental health (Greven et al., 2018). It further

opened a new area by conducting relatively innovative analyses through the investigation of sensitivity groups.

Regarding the association between SPS and mental health, the present study was the first to systematically investigate the role of SPS within the clinical context and included possible moderating variables. In particular, it revealed preliminary support for the theoretical assumption of cognitive reactivity explaining the relationship between SPS and negative affect (Wyller et al., 2017). HSPs tended to have various dysfunctional cognitions more, representing one indicator for the "dysfunctional thought content" (p. 4) aspect of the underlying suggested mechanism of cognitive reactivity. These biases are assumed to be activated in HSPs due to their characteristic of deep information processing and might lead to the onset of mental illness.

Also in line with this research gap is the question with regard to empirical support for the existence of vantage sensitivity in the clinical context (Villiers et al., 2018). The present study offers preliminary empirical support for HSPs benefitting more from clinical and therapeutic interventions.

One new finding of the present study is the significant difference between the two samples with regard to their mean scores on the HSP scale. While these results support the previous association with negative affect (for an overview, see Greven et al., 2018) and the aforementioned underlying mechanism focusing on the cognitive content (Wyller et al., 2017), they indicated some opposition to the recently proposed positive effects of the trait (Pluess, 2017). Although the results mentioned above are in support of vantage sensitivity when HSPs are treated therapeutically, it still might have implications regarding the time before teachers are admitted to the clinic and receive treatment. In particular, when the resulting six sensitivity groups were compared to each other, only the high sensitive groups of both samples differed significantly from each other on measures of SPS, further supporting the skewed distribution in the clinical sample towards the higher end. Questions resulting from these finding are, for example, whether there are other factors that might influence the seemingly higher risk for HSPs to be admitted to the clinic, such as their propensity for dysfunctional cognitions. Another question that arises in this context is related to the stability of the construct, particularly in the face of mental illness.

Might it be possible that the level of SPS can change through, for example, an increased focus on bodily and psychological sensations?

Although the results of the present study address many open questions, there are some that are still unanswered and others that should be addressed in future studies.

Second, the present study addressed the research gap of analyzing SPS in the workplace, in this case with a focus on teaching. While a first existing study on highly sensitive teachers was mainly interested in associations with negative affect quantitatively (Stefan Lindsay, 2017), the present study expanded upon these findings by investigating the different characteristics of the teachin profession more objectively (i.e., through a developed scale with items that are mainly phrased neutrally). In general support of these previous findings, this study found highly sensitive teachers to be particularly attuned to students. In particular, to students, particularly to those who need help and support. These findings do not only support the qualitative findings of the study by Stefan Lindsay (2017), but also first assumptions by E. N. Aron (1997), suggesting that teaching would be one career suitable for HSPs. Important factors for highly sensitive teachers are those tasks that are very open and have no natural limit. While this is something positive in terms of bringing satisfaction to HSPs, it also bares the risk of working too much and of not being able to not take work into their private lives. In addition to HSPs' tendency to be overstimulated more quickly by external conditions (e.g., Benham, 2006), including noises and lack of down time, this might be another aspect worth exploring in SPS research.

A more innovative insight into SPS was given by investigating whether different sensitivity types exist (at this point, I would like to thank Patrice Wyrsch again for the frequent enriching discussions and sharing his ideas with me). The three groups that have been found can be interpreted as sensitivity types as they all differ with regard to their particular focus on one or more specific facets. An interesting finding in this regard is the fact that the majority of the clinical sample was found to belong to the type that focused more on Aesthetic sensitivity, but, at the same time, revealed results that can be interpreted as more functional on the stress-related variables. Although no analyses based on the three facets as suggested by Smolewska and colleagues (2006) were applied, the focus set by participants in the present study was surprisingly similar to the assignment using the three facets.

Originally, it was expected that Aesthetic sensitivity might depict a representation of the positive aspect of SPS and maybe even act as an indicator for vantage sensitivity. Based on

this assumption, high levels of Aesthetic sensitivity might be able to predict positive effects of positive (environmental) experiences. When looking at the association with the remaining stress-related variables, on which HSPs assigned to this sensitivity type reached less dysfunctional scores, this might be true. Could it be that those patients are also those, who benefited the most from the intervention?

Contrary to this assumption were the results suggesting that the three types did not differ significantly from each other on therapeutic success. However, this aesthetically focused cluster was the one for which the least additional clinical data were available, which is an interesting coincidence. This leads to further questions, which have to be answered in the near future to further gain more insight into the construct. While the study revealed the first ever evidence for the existence of different sensitivity types that differ with regard to their specific focus, it also revealed seemingly divergent and contradicting findings, which have to be further investigated.

9.2.3. Practical implications for highly sensitive teachers in practice, experts in the field and other important stakeholders.

Given that SPS represents a temperamental trait, it is not surprising to further suggest implications for individuals with high levels of SPS. In the German field of teacher stress research, this can be summarized as behavioral prevention as it aims at helping individuals to better cope with any challenges and stressful situations by helping them develop the skills and abilities needed for successful coping. Based on the findings of the present study, this might be particularly helpful for highly sensitive teachers. Specifically, it was suggested that they applied dysfunctional coping strategies more frequently, had more dysfunctional cognitions, and revealed lower levels of self-efficacy.

Prior to describing some possible solutions of how to support (highly sensitive) teachers, the fundamental issue of stigmatization and acceptance should be discussed. Cultural conditions and circumstances often make it more difficult for individuals in Western cultures to accept characteristics associated with SPS, such as being aroused and overstimulated more easily and being more emotionally reactive (e.g., E. N. Aron, 1997). Individuals whose behaviors align with those valued by their particular culture, are also found to be more accepted by others (C. Chen et al., 1992). In some cases, individuals not conforming to the generally valued behavior

might even be seen as less mentally well (Zumbo & Taylor, 1993). Given this, it is not surprising that highly sensitive teachers might have difficulties showing those aspects of the trait that might be interpreted as vulnerabilities. This may manifest itself in them being unable to seek the time off to be alone to process information that they would need or by them suppressing their elevated emotional reactions to stimuli due to the fact that they feel misunderstood.

Working toward a general acceptance of diversity in personality traits is, therefore, very important. One way toward this goal is by portraying the trait through the media and by distributing information this way. The scientific presentation of information about the trait is particularly important considering the vast number of non-scientific newspaper articles, (self-help) books and TV interviews, which only offer a narrow view. The popular scientific field is very complex and involves numerous related issues that cannot be addressed in detail in this study, but it is important to note that this variety of information makes it very difficult for audiences who want to learn more about the topic, to focus on scientifically-supported media. The lack of scientific quality control in many media outlets contributes to this issue. It is therefore very important for scientists and experts in the field to actively engage with the media, such as through volunteering to act as an interview partner for diverse articles, such as the one recently published in (Dörsing, February 25, 2019), to strongly counteract the non-scientific information. One way to realize this is the publication of books that are informed by scientific results and strive for closer exchange between science and practice. The first German conference on SPS, organized by Kathrin Sohst in 2017, was a good example for a first step toward bridging scientific findings and the general public's interest. It involved talks and presentations by scientists (including one about the findings of the present study by the author; T. Tillmann, 2017), but also a discussion round in which the exchange and collaboration of science and practice was enhanced. Another way to promote science in the public is through the organization of regular information sessions and contact information of experts on the trait, such as those offered by the webpage "The Highly Sensitive Person" by Elaine N. E. N. Aron (2019) or the "Informations- und Forschungsverbund Hochsensibilität" (IFHS, 2019) in German-speaking areas.

Another option is providing openly accessible information about ongoing research findings in a way that is understandable by the general public. One example is the website hosted by

Patrice Wyrsch and Tillmann (2019), which includes a science-blog with articles that are written by a scientist and peer-reviewed by the respective other. The publication of relevant results in scientific journals and those admissible for the general public are also important.

Future efforts should also focus more on highly sensitive teachers given the difficulties that they might have in the work place. In addition to challenges with regard to the characteristics described and empirically supported in the present study, numerous additional aspects are assumed to pose high demands on highly sensitive teachers, including the ongoing noise, the lack of opportunity for breaks (i.e., in the way of having time alone during the day), and their increased investment into the deeper meaning of their profession. In addition to talks within the school context, the most applicable way is the cumulative effect of sharing experiences and information over time which leads to destigmatization. At this point, again, it is important to offer scientifically-based information and places for interested individuals to be able to get this information, as described above.
Addressing interested individuals also increases the chances of addressing those who may be highly sensitive themselves. One reason is the self-selection of the topic, which is particularly true for HSPs, who do not show the trait, tend to not believe it exists, and consequently would not actively engage in discussions about the topic (A. Aron, & E. N. Aron, personal communication, May 2, 2017).

This would be in line with findings by Stefan Lindsay (2017) and E. N. Aron (1997) who suggested that knowledge about the trait already helps individuals to understand and possibly reframe their experiences. It may also help them to listen to their own needs more closely and alleviate the sense of feeling misunderstood, lonely or different.

There are a few concrete examples to show how highly sensitive teachers may receive support in their professional lives, especially at the beginning of their careers.
For example, through mentoring programs, they could learn more about the demands and expectations of the profession, which would help them to prepare more accurately and find ways to deal with the challenges they might face. Developing relationships with experienced teachers can also be used to work on dysfunctional cognitions and possible effective coping strategies. Another aspect that would be important for highly sensitive teachers would be learning emotion regulation strategies in order to prevent elevated levels of stress or burnout

(Maslach & Leiter, 1999), and support coping (e.g., Lazarus, 2006). This is particularly important because emotion regulation strategies were found to mediate the relationship between SPS and stress (Brindle et al., 2015). Having a mentor to exchange with on a regular basis can also help build professional relationships and foster learning from each other. By offering this to all teachers, highly sensitive teachers might not be as hesitant to apply and make use of the opportunity.

While stress prevention programs may indeed have benefits for all teachers, they may be particularly useful for highly sensitive ones. One example is the program AGIL (Hillert et al., 2016), which has successfully been implemented into clinical practice (K. Lüdtke, 2017). It is especially valuable in that it addresses the factors important for teacher health, which are similar to the ones discussed in the present study. In order to motivate teachers to participate, the training could be introduced in schools across the country and offered on a regular basis by trained presenters. Furthermore, it could be incorporated into teachers' existing schedules in order to protect their free time.

In addition, the acceptance of certain emotions has been found to play an important role in the onset of stress in HSPs (see Greven et al., 2018). This would also be a suitable approach to help highly sensitive teachers. This can be realized by offering different exercises in the school context, such as meditation courses (Tang et al., 2007). Mindfulness-based exercises, such as mindfulness-based stress reduction (MBSR; Goldin & Gross, 2010), can help teachers to deal with emotions and stress. This approach was found to be particularly successful for HSPs (Soons, Brouwers, & Tomic, 2010). If resources for trainings at the school are not available, schools can direct teachers to and encourage them to use free online resources.

Additionally, teacher preparation programs might have the most influence on future teachers, not just on their knowledge, but also on their abilities and skills. It might therefore be suitable to include psoychoeducation about different personality traits, including SPS, into the curriculum. Additionally, it would also be helpful to support teachers in developing certain functional coping strategies and abilities to reflect on their cognitive content through specific seminars. One example for a successful implementation of the integration of empirical findings of teacher stress into the curriculum for future teachers is a seminar called "Strain in the Teaching Profession – Theoretical Backgrounds and Health-Promoting Coping" offered by the

Chair of School and Teacher Research or the course “Being relaxed in everyday school life – stress prevention as a basic competence of a healthy teacher personality” offered by the Munich Center for Teacher Education, both at the Ludwig-Maximilians-University in Munich, Germany. In particular with regard to SPS it may be worth considering adding information based on recent findings suggesting an association with negative affect and therapeutic success. Given the recent findings on associations between SPS and negative affect as well as those related to therapeutic success, it might be worth to consider adding further information on temperament into these courses as well.

As a final remark, it would be helpful for HSPs in general, but particularly highly sensitive teachers, if they could act based on their own needs more. Although the teaching profession might represent a suitable profession for HSPs because teachers can manage outside of the classroom relatively flexible, there still seems to be room for improvement. Highly sensitive teachers might, therefore, have to learn to plan this free time more around their needs.

One necessity would, for example, include more time alone in order to help reduce the level of stimulation. A possible way to this would be by applying a system found in other countries. In the United States or Canada, teachers stay in their classroom and the students switch classrooms. This would already help highly sensitive teachers in two significant ways: for one, it opens the opportunity for regular breaks with less stimulation (i.e., during the time when students switch their classrooms). Second, it also reduces stimulation that has its origin in the classroom environment, such as through decorations or the arrangement of furniture. If teachers remain in one classroom throughout the day, they have more control over the external stimulation (e.g., decorations, materials in the classroom, lighting, etc.). If they rotate classrooms, as it is common in Germany, they have less control over these factors and may feel more easily overstimulated.

Such a system does not only benefit highly sensitive teachers, but teachers in general. For instance, it gives greater opportunities for connections between students and teachers. If teachers have to rotate classrooms and students have an individual question for the teacher, it may be difficult to do so. If the teacher is late, it affects the whole class. On the other hand, if the teacher would stay in the same classroom, he or she would not only have more time for exchanges with individual students, but it would prevent him or her from being late to the next

class. This system is assumed to also enhance teaching quality. If teachers have their own classroom to teach in, they implement more diverse methods, including different kinds of media features, decorate the classroom with equipment and objects they can make use of efficiently, and, finally, can arrange the furniture and seating in a way that it suits their needs and supports their well-being.

The final note aims at concluding with a positive statement: Highly sensitive teachers feel highly connected to their students; they care and take their time and energy to support them as much as they can, and, given their own experiences, might be more open to understanding the struggles of their students, some of whom might also be highly sensitive. Given this positive asset of highly sensitive teachers and teachers' general important role in society and the future of the world, it is important that they feel seen and encouraged. They need principals, administrators, politicians, parents, students and collaboration partners to value and appreciate their investments in their everyday professional lives despite the challenges that come with these activities. One last implication is therefore the request that everyone involved in educational systems pays attention, appreciates each other more and tries to meet each other with a smile and a positive word. This is important for everybody, not just highly sensitive teachers and HSPs in general. SPS only represents one facet of diversity, which generally should be considered more in everyday life.

9.2.4. Practical implications for prevention and (clinical) interventions.

Finally, the results of the present study taken together with existing theoretical models and assumptions further support the importance of SPS in clinical settings. Supporting existing findings regarding prevention programs for children (Nocentini et al., 2018; Pluess & Boniwell, 2015), the present study also reveals preliminary evidence for the same process in adults within the clinical context. A tendency toward this direction was found despite the lack of statistical significance for some analyses which is assumed to be due to methodological issues. The underlying processes, which include genetic, physiological and psychological aspects (for a more detailed description of these entities, see Villiers et al., 2018), are interpreted as jointly responsible for the positive effects of particularly supportive and positive experiences. Taking together the results regarding the thought content (as one aspect of the underlying cognitive reactivity process) of the present study which support the underlying cognitive reactivity hypothesis by Wyller and colleagues (2017), they further strengthen the

notion that the malleability does not lie in the underlying mechanism of deeper information processing, but rather the secondary aspects of thought content and processes as well as emotional reactivity. This is particularly important for the clinical context as it supports the fact that related characteristics are changeable and not fixed, opening room for interventions to work in the first place. These lead to various implications for the therapeutic context as well, some of which are explained in the upcoming sections.

First, it affects decisions about who would have to receive treatment. In particular, if therapists and medical doctors would include an assessment of SPS by applying the HSP scale, as well as information about childhood experiences, individuals with the highest need for an intervention could be identified. This would lead to more efficient treatment (also with regard to an economic point of view). In the area of prevention science, this could even lead to a higher efficiency and significantly lower costs in the future, as early prevention might decrease the risk of certain consequences later in life, such as for unemployment, (mental) illnesses, or increased costs of treatment. However, given that the profile for a highly sensitive person is not static (i.e., SPS can manifest in various ways across individuals, as suggested by preliminary analyses of sensitivity types in the present study), the influences of these differences on therapeutic success is still an open question that needs to be answered by future research. Furthermore, it is still unclear whether SPS characteristics are stable within individuals over time (i.e., HSPs may be particularly perceptive at some points in their lives but not others), which might influence their future development. If this is not the case, of course, the question about when those particularly important times are, comes up, which also has to be answered to further implement findings into the clinical practice.

Second, the theoretical assumptions by Wyller and colleagues (2017) as well as Villiers and colleagues (2018) about the significance of cognitive processes paired with the empirical evidence of the present study, suggest the particular importance of dysfunctional cognitions for HSPs in general and, in case of the present study, highly sensitive teachers, which further represents an appropriate therapeutic intervention for those with high levels of SPS: Cognitive Behavioral Therapy (CBT; Dobson & Dozois, 2019; Hollon & Beck, 1994). CBT combines treatment methods focusing on cognition, emotion and behavior. Given its application across a wide range of mental disorders (see the overview by Butler, Chapman, Forman, & Beck, 2005) and the fact that SPS is assumed to be “transdiagnostic” (i.e., it is not dependent on

specific psychiatric disorders; Wyller et al., 2017, p. 4) it seems to be a particularly suitable approach for HSPs. Relating back to the practical implications for HSPs, Mindfulness-Based Cognitive Therapy (MBCT; Segal et al., 2013), or mindfulness-related interventions within the broad approach of Cognitive-Behavioral Therapy (e.g., Fruzzetti, McLean, & Erikson, 2019) might also be particularly effective for HSPs.

Third, including measures of SPS into the therapeutic context might also lead to a more individualized therapy, including the length and duration of therapy as well as the specific time frame (i.e., if such a time exists at which HSPs are particularly sensitive to certain kinds of stimulation). Based on the present and existing empirical results, it can be expected that HSPs, including highly sensitive teachers, might need a fewer number of therapy sessions to gain the same (and even more) benefit from it. Furthermore, given the finding that treatment benefits were found up to 12 months after the intervention (i.e., for a risk population of 11-year-old girls), this may influence the setting and timely framework in which therapeutic interventions are offered. In particular, the benefits even after 12 months were explained with the underlying information processing characteristic of SPS, which in turn "may have led to better internalization and, consequently, continued application of the acquired cognitive-behavioral coping strategies" (Pluess & Boniwell, 2015, p. 44). For HSPs, therapy sessions that are less frequent in a week (i.e., compared to the common average of one session per week), but take place over a longer period of time may be most suitable based on those findings.

Finally, SPS might also affect future investigations of therapeutic success. Given the existing and new results as well as the remaining question about the exact predictors of therapeutic success (e.g., Norcross & Lambert, 2011), it may be useful to include SPS and other temperament traits into future analyses. Given the existing results, SPS might be able to explain a significant amount of variance within the therapeutic process. Additionally, including SPS in these further investigations might help to understand better who benefits from certain interventions (i.e., such as HSPs) and who does not.

9.3. Critical Reflection of the Present Study and Implications for Further Research

When interpreting the results of the present study, which revealed various promising and important findings for the field of SPS and teacher professionalism research, some limitations have to be taken into consideration as well. As some of methodological criticism has been

discussed, the main six aspects are described only briefly hereafter, including suggestions for further research.

9.3.1. Measuring sensory-processing sensitivity at one point in time.

The first limitation is two-fold: On the one hand, SPS was only measured at one point in time during the study, and, on the other hand, those points in time were different for each patient (i.e., with regard to their treatment). Measuring SPS at the beginning and the end of a stay at the psychosomatic clinic could help further ruling out explanations, (e.g., such as a malleability of the trait due to mental illness) and help explain how a stay at a mental health institution might influence patients' perception of their own sensitivity. Future studies should include these considerations and plan their study designs accordingly. Further, the cross-sectional design used in the present study does not allow statements about causal relationships and none of the research questions investigated long-term effects. This would, however, be a possibility to learn more about underlying mechanisms.

9.3.2. Results only based on subjective evaluation.

Self-report measures, which are only filled in based an individual's own perception, are always subject to criticism and might bias the study's method (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). This has also been true for SPS research. In recent years, observational measures have been developed to measure SPS on a more objective basis (Greven et al., 2018). However, so far, this was only applied to 3 to 5-year old children (Lionetti et al., 2017). Furthermore, measuring dysfunctional cognitions on a more objective level is a challenge this area of research faces. Two suggestions unfold from this limitation: On the one hand, this observational measure must be replicated and transferred to other age groups in order to make it applicable to future studies. On the other hand, and regarding the present study, additional measures of SPS should be applied in clinical studies in future clinical studies, as the ability to objectively judge one's own more general perceptions in the state of mental illness may be worth discussing and analyzing. Additional examples in this regard would be physiological or genetic markers that have been found to relate to SPS.

The same is also true for the newly developed measure of work place characteristics of teachers based on conceptualizations by Rothland (2013). Because it is a newly developed scale it should be validated in a second independent sample. Furthermore, future studies should

consider also adding objective measures of the work place and compare them with the subjective perception in order to evaluate the accuracy of teachers' evaluation and increase validity.

9.3.3. Samples only included teachers.

Another important aspect that should be considered when interpreting the results is the sample, which only consists of teachers. On the one hand, this is problematic, because teachers do not represent the general population given their high education. On the other hand, they do represent a group of people that is more stressed and perceive strain in general and on a regular basis (e.g., Schaarschmidt, 2004), although other studies have not supported this assumption to be true in comparison with other professions (e.g., Albrecht, 2016). To address this shortcoming, future studies should aim at replicating the results, particularly those revealed within the clinical context, based on a sample that is more generalizable and consists not only of teachers.

9.3.4. Clinically-relevant additional data were only available for a small percentage.

The clinical data that were made available by the collaborating clinic added value to the present study. Having these data enabled gaining preliminary empirical evidence in support of the theory of vantage sensitivity (Pluess, 2017) in the clinical context. However, unfortunately the proportion of patients these kinds of data were available for was relatively small, which might have led to certain methodological and statistical constraints. Therefore, it would necessitate gaining further insight into the role of SPS in the clinical context, if future studies would be able to replicate and expand these findings.

9.3.5. Lack of information about the non-clinical sample.

Another limitation, which particularly effects the non-clinical sample, is the lack of information available. At first, the online version of the questionnaire was distributed through two platforms that belong to two teacher organizations for certain school types. While one of them addressed all teachers, independent of school type (i.e., the BLLV), the second one (i.e., BBB) represents an organization particularly for elementary school teachers. Consequently, the distribution of school types in the sample is not representative for the general public. Furthermore, these two organizations operate in Bavaria, Germany. All teachers in the non-clinical sample are

therefore assumed to be Bavarian teachers. Unfortunately, due to the issue of anonymity in the online data collection process, this cannot be reconstructed.

On the contrary, the clinical sample consists of teacher from across Germany. Given that aspects related to schools and education are regulated by the respective Länder (i.e., a total of 16 regions within Germany that are governed and regulated separately), this might lead to some differences between the two samples. Furthermore, due to missing data on the participants' hometowns, about the Land (i.e., a state within Germany) in which they work, or even certain schools, no connection between participants could be constructed. However, given the significance and vast variability in school administrations and school leadership, this information could have helped gain more insight into these processes. Had these data been available, more cmplex statistical analyses, such as multi-level analyses, could have been conducted.

9.3.6. Measurement of emotional reactivity and emotion regulation were not included in the present study.

One of the four main characteristics of SPS is enhanced emotional reactivity (E. N. Aron & Aron, 1997; E. N. Aron et al., 2012), which may play an important role in the perception of stress in HSPs (Wyller et al., 2017). In the present version of the HSP scale, however, this facet is not included. Furthermore, no other measure of emotional reactivity has been added to the present study to capture this aspect of SPS. Consequently, the present study was not able to consider the role of this emotional facet properly. However, this would have been of particular importance given the role of emotions in stress (Kaluza, 2011a), the onset of mental illness (Maslach & Jackson, 1986), the majority of models related to stress
(e.g., Lazarus, 2006), and at the same time in everyday school life for teachers (e.g., Skaalvik & Skaalvik, 2016). Therefore, future studies that follow a similar goal should include measures of emotional reactivity in the questionnaire. Additionally, emotion regulation was found to be important in this context and should be considered more frequently in studies on SPS.

9.3.7. No measurement of childhood experiences was included in the present study.

HSPs are generally more prone to negative affect and the development of mental illness if they have grown up in a less supportive, adverse environment (E. N. Aron & Aron, 1997; E. N. Aron et al., 2005). Therefore, adding measures of childhood experiences can be a great asset in a study. While this was not possible in the present study, future studies should consider

adding questions about the participants' childhood. Based on the findings of the present study, for example, it would be of particular interest to further investigate the underlying mechanism of some HSPs' development of mental illnesses, while others can seemingly deal with challenges better. Although it has been found that lower self-efficacy, more dysfunctional coping strategies and more dysfunctional cognitions might be one possible explanation, interactions with past childhood experiences would open a whole new and interesting line of research.

In addition to childhood experiences, HSPs' social situations and stressful life events may be of interest. This could help answer the question of whether life events influence SPS levels and, particular, whether the trait might be malleable later in life.

9.3.8. Lack of replication of sensitivity groups and its factorial structure.

The two final limitations of the present study include mainly methodological criticism regarding the construct's validity.

First, the three sensitivity groups found in previous studies (e.g., Lionetti et al., 2018; Pluess et al., 2018) could not be replicated in the present study. Rather, findings suggested the existence of two classes that followed a similar distribution. Despite the normal distribution of SPS mean scores, the relatively small sample size of the non-clinical sample might have been one reason for these results. While common suggestions, for example, refer to a minimum of 200 participants or 10 cases per variable (e.g., R. B. Kline, 2011), this was not always met in this study. However, other reasons and explanations are possible as well, leading to the assumption that the present non-clinical sample might not be generalizable. Given that the present findings were based on the assignment of participants on the basis of a theoretical distribution, they have to be replicated with another, independent, and bigger sample.

A second aspect is the factorial structure of the construct, which could not be replicated in the present study, nor could the bifactor analysis. Again, one reason for these findings could be the size of the samples. However, although evidence in support of the different facets and their contrasting effects on stress-related outcomes were revealed throughout the study, the different factors have not been analyzed individually or in line with specific research questions. This shortcoming should also be addressed in future studies. In particular, the effect of the two facets

EOE and LST and their influence in the onset of mental illness in a clinical context should be investigated in the future.

9.4. Conclusion

Teachers have an important role in society, given the amount of time their students spend with them in school and the important tasks teachers have to fulfill. At the same time the teaching profession is highly complex, including numerous demands and complex workplace characteristics that are unique to this profession. Investigating how individuals and those specific demands interact within the teaching context was, therefore, the main goal of this study. In particular, this goal was followed by including the temperament trait of sensory-processing sensitivity (SPS), characterized by an increased level of processing of external and internal information. Results suggest the present study's successful contribution to gaps within three lines of research: Research on teacher professionalism, teacher stress, and on SPS in general. In particular, SPS is shown to be a valid construct, which can be differentiated from measures of psychological ill-health (i.e., first general research goal) and represents a highly valuable trait that should be incorporated into the teaching professionalism research as highly sensitive teachers are found to show characteristics and attitudes that are highly treasured in this context. At the same time, their everyday school life and the complex environment, including diverse and often contradicting demands and characteristics, particularly those related to flexibility and illimitableness, also pose significant challenges for them. SPS can further explain why certain teachers might be more prone to negative affect given certain work place characteristics. Furthermore, preliminary evidence for the existence of vantage sensitivity, describing positive effects of supportive experiences in the clinical context was found, further revealing confirmation that prevention and intervention programs might particularly benefit highly sensitive people. Moreover, the present study opens new questions about different sensitivity types and their association with variables relevant for stress and teaching research, which need to be further investigated.

These four general aspects investigated in the present study have significant scientific and practical implications for various actors involved, including school-related stakeholders, highly sensitive individuals themselves, as well as clinical practitioners and researchers.

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References

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Appendix A: Questionnaire applied in the present study

Fragebogen
Erleben des Lehrerberufs

Projekt
der Ludwig-Maximilians-Universität München, Lehrstuhl für Schulpädagogik
und der Schön Klinik Roseneck, Prien am Chiemsee

ZUVERSICHT. Wie alle Berufstätigen sind Sie sicherlich auch mit schwierigen Situationen konfrontiert. Wir möchten gerne erfahren, wie zuversichtlich Sie sind, damit zurechtkommen.

Wie zutreffend ist folgende Aussage für Sie?	stimmt nicht	stimmt kaum	stimmt eher	stimmt genau
Wenn sich Widerstände auftun, finde ich Mittel und Wege, mich durchzusetzen. ……	○	○	○	○
Die Lösung schwieriger Probleme gelingt mir immer, wenn ich mich darum bemühe.	○	○	○	○
Es bereitet mir keine Schwierigkeiten, meine Absichten und Ziele zu verwirklichen. …	○	○	○	○
In unerwarteten Situationen weiß ich immer, wie ich mich verhalten soll. ……	○	○	○	○
Auch bei überraschenden Ereignissen glaube ich, dass ich gut mit ihnen zurechtkommen kann. ……	○	○	○	○
Schwierigkeiten sehe ich gelassen entgegen, weil ich meinen Fähigkeiten immer vertrauen kann. ……	○	○	○	○
Was auch immer passiert, ich werde schon klarkommen. ……	○	○	○	○
Für jedes Problem kann ich eine Lösung finden. ……	○	○	○	○
Wenn eine neue Sache auf mich zukommt, weiß ich, wie ich damit umgehen kann. ...	○	○	○	○
Wenn ein Problem auftaucht, kann ich es aus eigener Kraft meistern. ……	○	○	○	○

EINSTELLUNGEN UND HALTUNGEN. Die nächsten Abschnitte enthalten eine Reihe von Gedanken, Meinungen, Einstellungen oder persönlichen Grundsätzen, die Menschen haben und die ihr Erleben sowie Verhalten beeinflussen können. Wir möchten gerne erfahren, in welchem Ausmaß diese Einstellungen und Verhaltensweisen für Sie **in Bezug auf Ihren Beruf** zutreffen.

Bitte beantworten Sie die Fragen spontan, so wie Sie üblicherweise denken oder handeln. Es geht nicht darum, was allgemein als wünschenswert oder vernünftig erachtet wird, sondern um Ihre persönlichen Einstellungen und Gewohnheiten.

Wie zutreffend sind diese Einstellungen und Haltungen für Sie?	stimmt haupt nicht	über-			stimmt voll und ganz
Ich brauche es, dass die Leute mich mögen. ……	○	○	○	○	○

Es ist mir sehr wichtig, dass die Leute billigen, was ich tue.	○	○	○	○	○
Selbst ein geringes Risiko einzugehen ist dumm, denn wenn ich verliere, wird das eine Katastrophe sein.	○	○	○	○	○
Wenn ich bei meiner Arbeit versage, dann bin ich als ganzer Mensch ein Versager.	○	○	○	○	○
Es wäre schrecklich etwas zu tun, wenn ich dabei nicht weiß, was auf mich zukommt.	○	○	○	○	○
Ich gebe mir gewöhnlich selbst die Schuld, wenn sich die Dinge nicht gut entwickeln.	○	○	○	○	○
Ich habe extrem hohe Ziele.	○	○	○	○	○
Wenn ich nicht den höchsten Anspruch an mich stelle, dann ende ich wahrschein-lich als zweitrangiger Mensch.	○	○	○	○	○
Wenn ich nicht so gut bin wie andere Leute, bedeutet dies, dass ich ein Mensch von geringerem Wert bin.	○	○	○	○	○
Wie zutreffend sind diese Einstellungen und Haltungen für Sie?	stimmt über-haupt nicht				stimmt voll und ganz
Es ist sehr wichtig, wie andere Leute über mich denken.	○	○	○	○	○
Etwas spontan ausprobieren zu müssen, wäre schrecklich, denn es könnte ein Reinfall werden.	○	○	○	○	○
Ich kann es nicht ertragen, andere Leute um Unterstützung zu bitten.	○	○	○	○	○
Es ist für mich sehr wichtig, dass andere Leute das, was ich tue, mögen.	○	○	○	○	○
Wenn ich nicht ständig gut arbeite, dann werden die anderen mich nicht achten. ...	○	○	○	○	○
Ich würde meine Schwäche entblößen, wenn ich meine Kollegen um Unterstützung, Rat und Hilfe bitte.	○	○	○	○	○
Ich mache mir gewöhnlich Vorwürfe, wenn die Dinge schief gelaufen sind.	○	○	○	○	○
Andere scheinen für sich geringere Maßstäbe zu akzeptieren, als ich das tue.	○	○	○	○	○
Wenn etwas schief gelaufen ist, fühle ich mich schnell verantwortlich.	○	○	○	○	○

Wenn ich Kollegen oder Eltern um Unterstützung bitte, dann ist das ein Zeichen von Schwäche. ……	○	○	○	○	○
Ich setze mir höhere Ziele als die meisten meiner Kollegen. ……	○	○	○	○	○
Wenn ich ein Ziel nicht erreiche, gebe ich mir selbst die Schuld daran. ……	○	○	○	○	○
Ich vermeide es lieber Dinge auszuprobieren, wenn ich mir über das Ergebnis nicht ziemlich sicher bin. ……	○	○	○	○	○
Ich erwarte von mir höhere Leistungen bei meinen täglichen Aufgaben als die meisten anderen es von sich verlangen. ……	○	○	○	○	○
Wenn ich um Unterstützung bitte, ist dies ein Zeichen meiner Inkompetenz und Schwäche. ……	○	○	○	○	○

AUS DEM GLEICHGEWICHT. Die Reaktionen auf berufliche Belastungen sind ganz unterschiedlich.

Wie gehen Sie mit belastenden Situationen im Beruf um, die Sie **beeinträchtigen**, **innerlich erregen** oder **aus dem Gleichgewicht** bringen?

Bitte denken Sie an die letzten 2 Wochen: Was haben Sie im Zusammenhang mit solchen Belastungen üblicherweise gedacht, gefühlt oder getan?

Wenn mich Belastungen aus dem Gleichgewicht bringen …	gar nicht	kaum	möglicher-weise	wahr-scheinlich	sehr wahr-scheinlich
… versuche ich, ganz ruhig und gleichmäßig zu atmen. ……	○	○	○	○	○
… versuche ich, Haltung zu bewahren. ……	○	○	○	○	○
… versuche ich, die Gründe, die zu dieser Belastung geführt haben, genau zu klären. ……	○	○	○	○	○
… tue ich Dinge, die ich genieße. ……	○	○	○	○	○
… bin ich deprimiert. ……	○	○	○	○	○
… beschäftige ich mich mit etwas Angenehmen. ……	○	○	○	○	○
… neige ich dazu, zu resignieren. ……	○	○	○	○	○
… sage ich mir, du musst dich zusammenreißen. ……	○	○	○	○	○

Wenn mich Belastungen aus dem Gleichgewicht bringen …	gar nicht	kaum	möglicher-weise	wahr-scheinlich	sehr wahr-scheinlich
… ergreife ich Maßnahmen zur Beseitigung der Ursache der Belastung.	○	○	○	○	○
… sage ich mir, du darfst die Fassung nicht verlieren.	○	○	○	○	○
… erscheint mir alles so hoffnungslos.	○	○	○	○	○
… meide ich Menschen.	○	○	○	○	○
… möchte ich am liebsten ganz alleine sein.	○	○	○	○	○
… versuche ich mein Verhalten unter Kontrolle zu bringen.	○	○	○	○	○
… schließe ich mich von meiner Umgebung ab.	○	○	○	○	○
… mache ich mir einen Plan, wie man die Schwierigkeiten aus dem Weg räumen kann.	○	○	○	○	○
… versuche ich mir erst recht etwas Gutes zu gönnen.	○	○	○	○	○
… denke ich an etwas, das mich entspannt.	○	○	○	○	○
… tue ich etwas zu meiner Entspannung.	○	○	○	○	○
… neige ich dazu, alles sinnlos zu finden.	○	○	○	○	○
… nehme ich mir etwas Schönes vor und tue es.	○	○	○	○	○
… versuche ich mir alle Einzelheiten der Situation klar zu machen.	○	○	○	○	○
... schalte ich bei der Unterrichtsvorbereitung zurück.	○	○	○	○	○
... gehe ich beruflichen Anforderungen aus dem Weg.	○	○	○	○	○

BEFINDEN. In diesem Teil möchten wir gerne mehr über Ihr allgemeines Befinden erfahren. Bitte geben Sie an, welcher Aussage Ihr Befinden während der letzten Woche am besten entspricht / entsprochen hat.

Bitte lesen Sie jede Aussage und kreuzen Sie die Zahl 0, 1, 2, oder 3 an, die angeben soll, wie sehr die Aussage während der letzten Woche auf Sie zutraf. Es gibt keine richtigen oder falschen Antworten. **Versuchen Sie, sich spontan für eine Antwort zu entscheiden**.

Während der letzten Woche:	**0** gar nicht	**1** zu einem gewissen Grad	**2** in beträchtlichem Maße	**3** sehr stark
Ich fand es schwer, mich zu beruhigen.	○	○	○	○
Ich spürte, dass mein Mund trocken war.	○	○	○	○
Ich konnte überhaupt keine positiven Gefühle mehr erleben.	○	○	○	○
Ich hatte Atemprobleme (z.B. übermäßig schnelles Atmen, Atemlosigke ohne körperliche Anstrengung).	○	○	○	○
Es fiel mir schwer, mich dazu aufzuraffen, Dinge zu erledigen.	○	○	○	○
Ich tendierte dazu, auf Situationen überzureagieren.	○	○	○	○
Ich zitterte (z.B. an den Händen).	○	○	○	○

Während der letzten Woche:	**0** gar nicht	**1** zu einem gewissen Grad	**2** in beträchtlichem Maße	**3** sehr stark
Ich fand alles anstrengend.	○	○	○	○
Ich machte mir Sorgen über Situationen, in denen ich in Panik geraten un mich lächerlich machen könnte.	○	○	○	○
Ich hatte das Gefühl, dass ich mich auf nichts mehr freuen konnte. ..	○	○	○	○
Ich bemerkte, dass ich mich schnell aufregte.	○	○	○	○
Ich fand es schwierig, mich zu entspannen.	○	○	○	○
Ich fühlte mich niedergeschlagen und traurig.	○	○	○	○
Ich reagierte ungehalten auf alles, was mich davon abhielt, meir momentane Tätigkeit fortzuführen.	○	○	○	○
Ich fühlte mich einer Panik nahe.	○	○	○	○
Ich war nicht in der Lage, mich für irgendetwas zu begeistern.	○	○	○	○
Ich fühlte mich als Person nicht viel wert.	○	○	○	○
Ich fand mich ziemlich empfindlich.	○	○	○	○
Ich habe meinen Herzschlag gespürt, ohne dass ich mich körperlic angestrengt hatte (z.B. Gefühl von Herzrasen oder Herzstolpern).	○	○	○	○

Ich fühlte mich grundlos ängstlich. ……	○	○	○	○
Ich empfand das Leben als sinnlos. ……	○	○	○	○

Inwieweit treffen diese Aussagen auf Sie zu?

	trifft überhaupt nicht zu	trifft eher nicht zu	trifft eher zu	trifft voll und ganz zu
Ich fühle mich ausgebrannt. ……	○	○	○	○
Ich leide unter einem Burnout-Syndrom. ……	○	○	○	○

IHRE WAHRNEHMUNG. Menschen unterscheiden sich häufig darin, wie sie verschiedene Eindrücke wahrnehmen und verarbeiten. Manche nehmen dabei Sinnesreize sehr intensiv wahr und kommen damit gut zurecht, anderen fällt es hingegen schwerer diese zu verarbeiten. Deshalb würden wir im folgenden Abschnitt gerne mehr zu Ihren persönlichen Erfahrungen in der Schule, aber auch solche in privaten, außerschulischen Kontexten erfahren.

Bitte lesen Sie jede Aussage und kreuzen Sie an, wie sehr die Aussage im Allgemeinen auf Sie zutrifft. **Versuchen Sie, sich spontan für eine Antwort zu entscheiden. Richtige oder falsche Antworten gibt es nicht**.

Wie zutreffend ist folgende Aussage für Sie?	überhaupt nicht	eher nicht	teils / teils	eher	voll und ganz
Ich scheine Feinheiten in meiner Umgebung wahrzunehmen. ……	○	○	○	○	○
Ich fühle mich rasch überwältigt von Dingen wie gleißendem Licht, starken Gerü kratzigen Stoffen, oder Sirenen in meiner Nähe. ……	○	○	○	○	○

Wie zutreffend ist folgende Aussage für Sie?	überhaupt nicht	eher nicht	teils / teils	eher	voll und ganz
Ich habe ein reichhaltiges, komplexes Innenleben. ……	○	○	○	○	○

Ich fühle mich von Kunst oder Musik tief ergriffen. ……	○	○	○	○	○
Es irritiert mich, wenn ich in kurzer Zeit viel schaffen muss. ……..	○	○	○	○	○
Es nervt mich, wenn jemand versucht mich zu viele Dinge auf einmal tun zu la ……	○	○	○	○	○
Ich mache einen Bogen um gewalttätige Filme oder Fernsehsendungen. ……	○	○	○	○	○
Veränderungen im Leben bringen mich durcheinander. ……..	○	○	○	○	○
Ich bemerke und genieße zarte oder feine Gerüche, Aromen, Klänge oder Kunstw ……	○	○	○	○	○
Ich finde es unangenehm viel um die Ohren zu haben. ……..	○	○	○	○	○
Ich fühle mich gestört durch intensive Reize, wie laute Geräusche oder chaotische Szenen. ……	○	○	○	○	○
Wenn ich mit anderen konkurrieren oder vor anderen etwas machen muss, dann werde ich so nervös und zittrig, dass ich viel schlechter bin als ich normalerweise sein könnte. ……	○	○	○	○	○

VEREINBARKEIT VON BERUFSLEBEN UND PRIVATLEBEN. Da Lehrerinnen und Lehrer meist in der Schule und zu Hause einen Arbeitsplatz haben, ist es nicht ganz leicht, Beruf und Privatleben auszubalancieren. Wie gelingt Ihnen das?

Wie häufig haben Sie in der vergangenen Woche Folgendes erlebt?	stimmt gar nicht					stimmt genau
Ich bin zufrieden mit meiner Balance zwischen Arbeit und Privatleben. …… …..	○	○	○	○	○	○
Es fällt mir schwer, Berufs- und Privatleben miteinander zu vereinbaren. …….	○	○	○	○	○	○
Ich kann die Anforderungen aus meinem Privatleben und die Anforderungen aus meinem Berufsleben gleichermaßen erfüllen. .. …….	○	○	○	○	○	○
Es gelingt mir einen guten Ausgleich zwischen belastenden und erholsamen Tätigkeiten in meinem Leben zu erreichen. …….	○	○	○	○	○	○
Ich bin zufrieden damit, wie meine Prioritäten in Bezug auf den Beruf und das Privatleben verteilt sind. …….	○	○	○	○	○	○

INWIEWEIT trifft diese Aussage auf Sie zu: **Mein Privatleben ist mir wichtiger als mein Beruf**.

stimmt gar nicht ○ ○ ○ ○ ○ ○ stimmt genau

IHRE ARBEIT. Jede Lehrerin/jeder Lehrer nimmt den Beruf unterschiedlich wahr und sammelt verschiedene Erfahrungen am Arbeitsplatz Schule. Wir interessieren uns dafür, wie Sie Ihre Tätigkeit erleben und welche Erfahrungen Sie machen. Bitte kreuzen Sie an, wie jede Aussage im Allgemeinen auf Sie zutrifft.

Wie zutreffend ist folgende Aussage für Sie?	stimmt nicht	stimmt kaum	stimmt eher	stimmt genau
Außerhalb der Unterrichtszeiten kann ich mir meine Arbeitszeit selbst einteilen. ……	○	○	○	○
Ich habe eigentlich nie das Gefühl, richtig „fertig“ mit meiner Arbeit zu sein. ……	○	○	○	○
In meinem Beruf als Lehrkraft muss ich mit vielen unterschiedlichen Mensch zusammenarbeiten. ……	○	○	○	○
Ich freue mich über große Erfolge meiner Schüler/innen als wären es meine eigenen. ……	○	○	○	○
Meinen Einfluss auf die Leistung meiner Schüler/innen erlebe ich als gering. ……	○	○	○	○
Als Lehrkraft erfahre ich nicht von den langfristigen Erfolgen meiner Schüler/innen. .	○	○	○	○
Ich erlebe meinen Beruf als Beruf ohne Karrieremöglichkeiten. ……	○	○	○	○
Kreativität ist eine meiner Stärken als Lehrer/innen.	○	○	○	○
Es ist ein gängiges Vorurteil gegenüber Lehrkräften, dass sie „vormittags arbeiten u nachmittags frei haben“. ……	○	○	○	○
Ich kann selbst entscheiden, wie viel Zeit ich neben dem Unterrichten in Arbeit bzw. Privates investiere. ……	○	○	○	○

Wie zutreffend ist folgende Aussage für Sie?	stimmt nicht	stimmt kaum	stimmt eher	stimmt genau
Ich denke, dass ich als Lehrer/in bisher gute Entscheidungen getroffen habe.	○	○	○	○
Ich habe das Gefühl, dass ich immer noch mehr tun kann. ……	○	○	○	○
In meinem Beruf als Lehrkraft muss ich mit vielen unterschiedlichen Institution zusammenarbeiten. ……	○	○	○	○
Ich spüre, was in einer Klasse passieren wird, noch bevor es wirklich geschieht. …….	○	○	○	○
Ich als Lehrkraft habe großen Anteil an den Leistungen meiner Schüler/innen. ……	○	○	○	○
Mir fehlt eine Rückmeldung über langfristige Folgen meines Unterrichts. ……	○	○	○	○
Ich fühle mich meinen Schüler/innen verbunden.	○	○	○	○
Mein Beruf bietet mir keine Aufstiegsmöglichkeiten. ……	○	○	○	○
Alle denken, sie können im Lehrerberuf mitreden. ……	○	○	○	○
Die Schule ist für mich nicht nur ein Arbeitsplatz. ……	○	○	○	○
Zu entscheiden, wann ich mit meinen Unterrichtsvorbereitungen fertig bin, empfinde ich einfach. ……	○	○	○	○
Ich bin erfolgreich als Lehrer/in.	○	○	○	○
Ich empfinde es als angenehm, dass ich meine Unterrichtsstunden sehr offen gestalten kan ……	○	○	○	○
Die Zusammenarbeit mit einigen Menschen empfinde ich als schwierig. ……	○	○	○	○
Andere Menschen urteilen über den Lehrerberuf, weil sie selbst einmal eine Schule besucht haben. ……	○	○	○	○
	○	○	○	○
Ich denke viel darüber nach, wie ich in der Vergangenheit unterrichtet habe und wie ich in Zukunft unterrichten werde.	○	○	○	○
Die Leistungen meiner Schüler/innen sind in großem Maße von meinen Bemühungen Lehrkraft abhängig. ……	○	○	○	○
Misserfolge meiner Arbeit werden mir von Schüler/innen sofort rückgemeldet. …….	○	○	○	○

Wie zutreffend ist folgende Aussage für Sie?	stimmt nicht	stimmt kaum	stimmt eher	stimmt genau
Meine Kolleg/innen halten mich für eine/n gute/n Lehrer/in.	○	○	○	○
Mein Beruf bringt es mit sich, dass ich mich auch über das reguläre Maß hinaus engagieren muss (z.B. in Projekten, Schullandheim usw.).	○	○	○	○
Ich fühle mich besonders den Schüler/innen verbunden, die Hilfe brauchen.	○	○	○	○
Ich empfinde es als schwierig, einzuschätzen, wann meine persönlichen Bemühungen und mein Engagement ausreichen.	○	○	○	○
Ich empfinde es als angenehm, dass ich pädagogische Spielräume habe.	○	○	○	○
Ich spüre den Unmut meiner Schüler/innen als wäre es mein eigener, unabhängig davon, ob ich es zeige oder nicht.	○	○	○	○
Mein Erfolg als Lehrkraft wird an den Leistungen meiner Schüler/innen gemessen.	○	○	○	○
Ich vermisse positive Rückmeldung von Eltern.	○	○	○	○
Ich spüre, wenn ein/e Schüler/in Hilfe braucht.	○	○	○	○
Mein Engagement wird nicht angemessen honoriert.	○	○	○	○
Ich bleibe ruhig im Klassenzimmer.	○	○	○	○
Im Großen und Ganzen bin ich gerne Lehrer/in.	○	○	○	○
Die Zusammenarbeit mit Institutionen empfinde ich als schwierig.	○	○	○	○
Unterrichtserfolg ist nur schwer sichtbar.	○	○	○	○
Andere Menschen denken, sie können im Lehrerberuf mitreden, weil sie selbst Kinder erziehen.	○	○	○	○
Eltern halten mich für eine/n gute/n Lehrer/in.	○	○	○	○
Die Trennung zwischen Arbeit und Privatem gelingt mir.	○	○	○	○
Die Balance zwischen meinen pädagogischen Freiheiten und den rechtlichen Rahmenbedingungen zu halten, empfinde ich als schwierig.	○	○	○	○
Ich vermisse positive Rückmeldung von Schüler/innen.	○	○	○	○
Stärkeres Engagement wird nicht über die Bezahlung honoriert.	○	○	○	○

Wie zutreffend ist folgende Aussage für Sie?	stimmt nicht	stimmt kaum	stimmt eher	stimmt genau
Ich kann mir nicht aussuchen, mit wem ich zusammenarbeite. ……	○	○	○	○
Meine Schüler/innen mögen mich. ……	○	○	○	○
Allen Schüler/innen gerecht zu werden, erscheint mir kaum möglich. ……	○	○	○	○
Arbeit und Privates zu trennen, empfinde ich als schwierig. ……	○	○	○	○
Es wird von mir erwartet, dass ich mich bezüglich meiner Gefühle und meines Verhaltens nach den Vorgaben verhalte. ……	○	○	○	○
Die rechtlichen/administrativen Vorgaben sind kontraproduktiv für meine Arbeit mit den Schüler/innen. ……	○	○	○	○
Ich kann die Disziplin im Klassenraum aufrechterhalten. ……	○	○	○	○
Einzuschätzen, was die Schüler/innen gerade brauchen, fällt mir oft schwer. ……	○	○	○	○
Mein Status als Experte für guten Unterricht wird von Menschen, die nicht im Kontext Schu arbeiten, angezweifelt. ……	○	○	○	○
Mein Einfluss auf das Verhalten der Schüler/innen ist gering. ……	○	○	○	○
Ich könnte immer noch mehr machen. ……	○	○	○	○

ERWARTUNGEN. In diesem Teil möchten wir gerne von Ihnen wissen, welche Erwartungen in Ihrem Beruf an Sie gestellt werden und wie Sie diese Erwartungen wahrnehmen.

Bitte lesen Sie jede Aussage und kreuzen Sie an, wie sehr die Aussage im Allgemeinen auf Sie zutrifft.

Wie zutreffend ist folgende Aussage für Sie?	trifft überhaupt nicht zu	trifft nicht zu	eher trifft zu	eher trifft und zu	voll ganz
Die verschiedenen Rollen, die ich als Lehrer/in habe, lassen mich im Kontakt mit andere Menschen niemals „echt“ oder authentisch sein. ……	○	○	○	○	
Mein Verhalten passe ich den Anforderungen, die der Beruf an mich stellt, an. ……	○	○	○	○	
Es ist schon oft vorgekommen, dass ich die Erwartungen, die an mich gestellt werden, nicht erfüllen konnte. ……	○	○	○	○	

Ich bin häufig mit widersprüchlichen Erwartungen konfrontiert. ……	○	○	○	○
Das Ausbalancieren verschiedener Erwartungen fällt mir schwer. ……	○	○	○	○
Im Allgemeinen versuche ich mich an die Erwartungen, die an mich als Lehrkraft gestel werden, anzupassen. ……	○	○	○	○
Allen Erwartungen, die an mich als Lehrkraft gestellt werden, gerecht zu werde empfinde ich als schwierig. ……	○	○	○	○
Ich bin mir bewusst, dass es verschiedene Rollen gibt, die ich im Schulalltag einnehme muss. ……	○	○	○	○
Es gibt Situationen, in denen ich bestimmte Verhaltensweisen bzw. Emotionen zeige muss, die meinen eigenen Überzeugungen widersprechen. ……	○	○	○	○

KOOPERATION. Bei den folgenden Fragen geht es um die Zusammenarbeit mit Ihren Kolleginnen und Kollegen. Bitte geben Sie zunächst an, **wie häufig Sie die beschriebenen Tätigkeiten ausüben.**

Wie häufig üben Sie die folgenden Tätigkeiten aus?	nie	selten	häufig	sehr häufig
Wichtige berufsbezogene Informationen teile ich meinen Kolleg/innen mit. ……	○	○	○	○
Ich halte mich mit Kolleg/innen über arbeitsrelevante Themen auf dem Laufenden. .	○	○	○	○
Ich tausche mit meinen Kolleg/innen Unterrichtsmaterialien aus. ……	○	○	○	○
Ich verständige mich mit meinen Kolleg/innen über die Inhalte meines Unterrichts. .	○	○	○	○
Mit meinen Kolleg/innen tausche ich mich über disziplinarische Probleme bei Schüler/innen aus. ……	○	○	○	○
Mit den Kolleg/innen tausche ich mich über berufliche Erfolge und Misserfolge aus.	○	○	○	○
Mit meinen Kolleg/innen bespreche ich mich, wenn ich Schwierigkeiten mit einzelnen Schüler/innen habe. ……	○	○	○	○
Mit meinen Kolleg/innen erstelle ich gemeinsam Arbeitsblätter. ……	○	○	○	○
Mit meinen Kolleg/innen erarbeite ich Konzepte für neue Unterrichtsprojekte. ……	○	○	○	○

Wie häufig üben Sie die folgenden Tätigkeiten aus?	nie	selten	häufig	sehr häufig
Es kommt vor, dass ich gemeinsam mit meinen Kolleg/innen Unterricht vorbereite.	○	○	○	○
Meine Kolleg/innen und ich unterstützen uns gegenseitig bei der Korrektur von Tests und Klausuren. …….	○	○	○	○
Um ein Feedback zu erhalten, führe ich mit meinen Kolleg/innen Unterrichts-hospitationen durch. …….	○	○	○	○
Mit meinen Kollegen/innen unterrichte ich gemeinsam eine Klasse. …….	○	○	○	○
Es kommt vor, dass ich von den Kolleg/innen eigene Unterrichtsbestandteile kritisch und konstruktiv bewerten lasse. ……	○	○	○	○

Bitte beschreiben Sie nun die Kooperation mit Ihren Kolleg/innen. Inwiefern treffen die folgenden Aussagen zu?

Inwiefern treffen die Aussagen zu?	trifft überhaupt nicht zu	trifft eher nicht zu	trifft eher zu	trifft völlig zu
Es gibt Kolleg/innen, die sich nicht an Absprachen halten, die für eine Zusammenarbeit wichtig sind. ……..	○	○	○	○
Es gibt Kolleg/innen, die stur ihre Konzepte durchbringen wollen. ……..	○	○	○	○
Es gibt Kolleg/innen, die nicht kooperationsbereit sind. ……	○	○	○	○
Unter den Kolleg/innen mögen wir uns persönlich nicht besonders. ……..	○	○	○	○
Meine Kolleg/innen sind mir sympathisch. ……..	○	○	○	○
Ich komme mit meinen Kolleg/innen in der Fachgruppe nicht klar. ……	○	○	○	○
Meine Kolleg/innen sind mir sympathisch. ……..	○	○	○	○
Wir gehen in Bezug auf Unterrichtsinhalte sehr unterschiedlich vor. ……..	○	○	○	○
Wir liegen bei unserer Arbeit alle auf einer gemeinsamen Linie. ……	○	○	○	○
Wir können oft kein gemeinsames Ziel finden. ……..	○	○	○	○
Für Kooperation planen wir bewusst Zeit ein. ……	○	○	○	○

Inwiefern treffen die Aussagen zu?	trifft überhaupt nicht zu	trifft eher nicht zu	trifft eher zu	trifft völlig zu
Es gibt keinen Zeitrahmen für eine produktive Zusammenarbeit mit Kolleg/innen. ……..	○	○	○	○
Wir haben fest verankerte Zeitstrukturen für die Kooperation. ……	○	○	○	○
Wir haben die für eine Kooperation nötigen Zeitstrukturen. ……	○	○	○	○
Die Kooperation wird „von oben“ angeordnet. ……	○	○	○	○
Die Kooperation mit Kolleg/innen beruht nicht auf Freiwilligkeit. ……	○	○	○	○
Kooperation findet nur um ihrer selbst willen statt. ……	○	○	○	○

Inwieweit ist für Sie die Kooperation mit Ihren Kolleg/innen hilfreich?

Inwiefern treffen die Aussagen zu?	trifft überhaupt nicht zu	trifft eher nicht zu	trifft eher zu	trifft völlig zu
Bei Problemen finde ich bei meinen Kolleg/innen ein offenes Ohr. ……..	○	○	○	○
Ich kann bei Misserfolg im Unterricht bei meinen Kolleg/innen mal „Dampf ablassen“. ……..	○	○	○	○
Ich kann offene Gespräche mit meinen Kolleg/innen führen, die mich entlasten.	○	○	○	○
Durch die Kooperation erfahre ich, dass meine Kolleg/innen ähnliche Probleme haben wie ich. ……	○	○	○	○
Ich kann von den Erfahrungen meiner Kolleg/innen im experimentellen Bereich profitieren. ……	○	○	○	○
Mein eigener Unterricht wird durch den regen Materialaustausch mit anderen Lehrkräften bereichert. ……	○	○	○	○
Von Kolleg/innen erfahre ich eine Unterstützung für meine eigene Unterrichtsvorbereitung. ……	○	○	○	○
Ich kann die Erfahrungen meiner Kolleg/innen für meinen eigenen Unterricht nutzen. ……	○	○	○	○

Inwiefern treffen die Aussagen zu?	trifft überhaupt nicht zu	trifft eher nicht zu	trifft eher zu	trifft völlig zu
Kooperation mit meinen Kolleg/innen bedeutet immer Mehrarbeit. ……	○	○	○	○
Die Kooperation mit Kolleg/innen ist im Vergleich zur Einzelarbeit ein höherer Aufwand. ……	○	○	○	○
Die für Kooperation aufgebrachte Zeit mit meinen Kollegen/innen steht in keinem Verhältnis zum Ergebnis. ……	○	○	○	○
Durch die Kooperation entwickeln wir einen gemeinsamen Blick auf die Lernergebnisse der Schüler/innen. ……	○	○	○	○
Die Schüler/innen profitieren von unserer gemeinsamen Linie hinsichtlich ihres Leistungszuwachses. ……	○	○	○	○
Durch die Kooperation entwickeln wir Maßstäbe in Bezug auf die Schülerleistungen. ……	○	○	○	○
Die Lernprozesse der Schüler/innen werden durch die Kooperation besser gefördert. ……	○	○	○	○

DATUM _____

ABSCHLIEßEND bitten wir Sie um einige Angaben zu Ihrer Person, Ihrer aktuellen Lebenssituation und Ihrem Beruf:

Ihre Geschlechtszugehörigkeit

weiblich ○

männlich ○

Ihr Alter

_____ Jahre

Ihr Familienstand

ledig ○ geschieden/getrennt lebend ○

mit Partner lebend/verheiratet ○ verwitwet ○

Haben Sie Kinder? Wenn ja, wie viele Kinder haben Sie?

nein ○

ja ○ Ich habe _____ Kinder, davon leben_____ in meinem Haushalt.

Gibt es Angehörige, für deren Pflege Sie verantwortlich sind?

nein ○

ja ○ Ich bin für die Pflege von _____ Angehörigen (Anzahl) verantwortlich.

○ Die von mir gepflegte/n Person/en lebt/leben in meinem Haushalt.

○ Die von mir gepflegte/n Personen lebt/leben **nicht** in meinem Haushalt.

Wie viele Jahre Berufserfahrung haben Sie (einschließlich Referendariat)?

_____ Jahre

An welchem Schultyp unterrichten Sie?

Grundschule ○ Gymnasium ○

Mittel-/Hauptschule ○ Förderschule ○

Realschule ○ anderes: ○

Üben Sie eine dieser Funktionen aus?

Schulpsycholog/in ○

Beratungslehrer/in ○

Schulleiter/in ○

_____

Welche Fächer unterrichten Sie (überwiegend)?

1.	3.
2.	4.

Wir danken Ihnen für Ihre Unterstützung!

Appendix B: Original Highly Sensitive Person (HSP)-Scale as developed by E. N. Aron and Aron (1997)

Table 1
Highly Sensitive Person Scale Items Used in Studies 2–7

Item	Study					
1. Are you easily overwhelmed by strong sensory input? (.56)	2	3	4	5	6	7
2. Do you seem to be aware of subtleties in your environment? (.24)					6	7
3. Do other people's moods affect you? (.38)	2			5	6	7
4. Do you tend to be more sensitive to pain? (.55)	2		4	5	6	7
5. Do you find yourself needing to withdraw during busy days into bed or into a darkened room or any place where you can have some privacy and relief from stimulation? (.64)	2	3	4	5	6	7
6. Are you particularly sensitive to the effects of caffeine? (.40)	2		4	5	6	7
7. Are you easily overwhelmed by things like bright lights, strong smells, coarse fabrics, or sirens close by? (.61)				5	6	7
8. Do you have a rich, complex inner life? (.25)					6	7
9. Are you made uncomfortable by loud noises? (.55)	2	3	4	5	6	7
10. Are you deeply moved by the arts or music? (.30)					6	7
11. Does your nervous system sometimes feel so frazzled that you just have to get off by yourself? (.59)					6	7
12. Are you conscientious? (.24)					6	7
13. Do you startle easily? (.50)		3		5	6	7
14. Do you get rattled when you have a lot to do in a short amount of time? (.62)		3		5	6	7
15. When people are uncomfortable in a physical environment do you tend to know what needs to be done to make it more comfortable (like changing the lighting or the seating)? (.33)					6	7
16. Are you annoyed when people try to get you to do too many things at once? (.54)				5	6	7
17. Do you try hard to avoid making mistakes or forgetting things? (.53)					6	7
18. Do you make a point to avoid violent movies and TV shows? (.31)	2	3	4	5	6	7
19. Do you become unpleasantly aroused when a lot is going on around you? (.55)				5	6	7
20. Does being very hungry create a strong reaction in you, disrupting your concentration or mood? (.36)				5	6	7
21. Do changes in your life shake you up? (.64)				5	6	7
22. Do you notice and enjoy delicate or fine scents, tastes, sounds, works of art? (.34)					6	7
23. Do you find it unpleasant to have a lot going on at once? (.62)				5	6	7
24. Do you make it a high priority to arrange your life to avoid upsetting or overwhelming situations? (.56)	2	3		5	6	7
25. Are you bothered by intense stimuli, like loud noises or chaotic scenes? (.64)				5	6	7
26. When you must compete or be observed while performing a task, do you become so nervous or shaky that you do much worse than you would otherwise? (.51)	2	3	4	5	6	7
27. When you were a child, did parents or teachers seem to see you as sensitive or shy? (.37)					6	7

Note. Values in parentheses after each item are its loading on the first unrotated factor in Study 6 (N = 172).

Figure B. Screenshot of original HSP scale (from: Aron & Aron, 1997, p. 352).

Appendix C: Statistical Analyses of Normal Distribution on all Relevant Psychological Variables

The following two tables include results of analyses of normality on all variables included in the study for every sample separately. In line with the ongoing discussion in the statistical literature, the q-q-plots, box plots, scores of kurtosis and the results of the Kolmogorov-Smirnov-tests were inspected in order to determine whether the data followed a normal distribution and whether outliers and extreme cases are found. The scores for skewness and kurtosis were then transformed into standardized z-scores. In cases in which the Kolmogorov-Smirnov-test and the z-standardized scores of skewness and kurtosis implied that the assumption of normal distribution was not met, scores were transformed using three types of transformation (i.e., square root transformation, 1/variable transformation and the logarithm transformation). If the transformation of data lad to a normal distribution, this transformation was then applied for the main analyses of the present study coming analyses. If no transformation lead to the normal distribution assumption to be met, an alternative non-parametric statistical test had to be applied in the main analyses.

In particular, this appendix consists of three table:

- The first table (Table C1) includes statistical tests of normality as well as the z-scores for skewness and kurtosis on the original sample size for the clinical (n = 130) and the non-clinical (n = 194) sample separately. Furthermore, it includes information about the results of the transformation process.
- Table C2 taks findings displayed in the first table into account and evaluates the variables' normal distributions based on the adjusted and reduced data set (i.e., of the non-clinical sample).
- Finally, the third table (Table C3) also summarizes the results of tests for normality of the additional variables that were available for the clinical sample.

Table C1

Summary of Results Analyzing Normality of All Variables for Both Samples Separately Based on the Original Data Sets

Variable	Clinical sample (n = 130)				Non-clinical sample (n = 189)			
	Kolmogorov-Smirnov-test	Z-score skewness	Z-Score kurtosis	Type of trans-formation	Kolmogorov-Smirnov-test	Z-Score skewness	Z-Score kurtosis	Type of trans-formation
Self-efficacy	$D(130) = 0.09$**	1.19	0.07	n.a.	$D(194) = .13$***	4.49	6.23	Excluding 5 outliers
Work-life Balance (Syrek et al., 2011)	$D(130) = .13$***	3.48	0.14	unsuccessful	$D(189) = .12$***	2.30	1.14	unsuccessful
Dysfunctional cognitions								
Dependency	$D(130) = .13$***	2.71	0.31	unsuccessful	$D(189) = .10$***	1.44	1.00	n.a.
Internalization of failure	$D(130) = .11$***	1.90	1.50	n.a.	$D(189) = .12$***	0.11	1.00	n.a.
Depreciation and failure	$D(130) = .10$**	2.14	1.57	unsuccessful	$D(189) = .20$***	7.33	3.51	unsuccessful
Perfectionism	$D(130) = .15$***	2.72	0.67	unsuccessful	$D(189) = .08$**	1.28	0.83	n.a.
Avoidance of social support	$D(130) = .12$***	3.62	0.40	unsuccessful	$D(189) = .18$***	6.56	3.26	unsuccessful
Risk avoidance	$D(130) = .12$***	1.57	1.40	n.a.	$D(189) = .11$***	3.22	0.54	Square-root-transformation
Coping strategies								
Relaxation	$D(130) = .13$***	2.33	0.05	Square-root transformation	$D(189) = .10$***	1.00	0.86	n.a.
Social withdrawal	$D(130) = .11$**	1.05	1.98	unsuccessful	$D(189) = .14$***	3.17	1.14	unsuccessful
Control of reaction	$D(130) = .11$**	2.90[r]	0.05	Square-root-transformation	$D(189) = .09$**	1.39	1.66	n.a.
Proactive problem solving	$D(130) = .09$*	1.38	1.00	n.a.	$D(189) = .01$**	1.72	0.86	n.a.
Exploration of positive experiences	$D(130) = .12$***	1.86	0.64	n.a.	$D(189) = .11$***	1.94	1.37	n.a.

(continued)

Variable	Clinical Sample (n = 130)				Non-clinical Sample (n = 189)			
	Kolmogorov-Smirnov-Test	z-score Skewness	z-Score Kurtosis	Type of Trans-formation	Kolmogorov-Smirnov-Test	z-Score Skewness	z-Score Kurtosis	Type of Trans-formation
Resignation	$D(130) = .09$*	0.19	1.81	n.a.	$D(189) = .12$***	3.72	0.57	Square-root-transformation
Psychological well-being								
Depression	$D(130) = .09$**	0.86	37.50	unsuccessful	$D(189) = .20$***	10.06	10.09	unsuccessful
Anxiety	$D(130) = .14$***	3.62	5.24	unsuccessful	$D(189) = .28$***	12.33	14.97	unsuccessful
Stress	$D(130) =$ .08, n.s.	0.62	1.81	n.a.	$D(189) = .12$***	4.06	0.09	Logarithm transformation
Sensory-Processing Sensitivity	$D(130) = .10$**	0.47	1.81	n.a.	$D(189) =$ .04, n.s.	0.13	0.44	n.a.

Note. The following transformation methods were applied: logarithm transformation, square root transformation, 1/(variable)-transformation. Colored scores (i.e., grey) in the table represent those that reached or exceeded the threshold of 1.96. n.s. = not significant; n.a. = not applicable (because the standardized score of skewness and kurtosis did not reach the threshold of 1.96); unsuccessful = no transformation method lead to standardized scores below the threshold of 1.96. This was determined after trying all aforementioned transformation methods; t-test= independent-samples t-test; U= Mann-Whitney U test.

*$p < .05$; **$p < .01$; ***$p < .001$.

[r] = data had to be reserved before it could be transformed.

Table C2

Summary of Results Analyzing Normality of All Variables for Both Samples Separately Based on Adjusted Data Sets

Variable	Clinical sample (n = 130)			Non-clinical sample (n = 189)		
	Kolmogorov-Smirnov-test	z-score skewness	z-score kurtosis	Kolmogorov-Smirnov-test	z-score skewness	z-score kurtosis
Self-efficacy	$D(130) = 0.09$**	1.19	0.07	$D(189) = .11$***	1.53	1.39
Work-life balance (Syrek et al., 2011)	$D(130) = .13$***	3.46	0.14	$D(189) = .12$***	2.36	1.13
Dysfunctional cognitions						
Dependency	$D(130) = .13$***	2.71	0.31	$D(189) = .10$***	1.49	0.99
Internalization of failure	$D(130) = .11$***	1.89	1.48	$D(189) = .12$***	0.02	1.00
Depreciation and failure	$D(130) = .10$**	1.12	1.57	$D(189) = .20$***	7.46	3.50
Perfectionism	$D(130) = .15$***	2.74	0.65	$D(189) = .08$**	1.32	0.82
Avoidance of social support	$D(130) = .12$***	3.58	0.39	$D(189) = .18$***	6.64	3.23
Risk avoidance	$D(130) = .12$***	1.56	1.40	$^{1}D(189) = .10$***	1.07	1.13
Coping strategies						
Relaxation	$^{1}D(130) = .10$**	0.29	0.45	$D(189) = .10$***	1.03	0.86
Social withdrawal	$D(130) = .11$**	1.03	1.96	$D(189) = .14$***	3.24	1.13
Control of reaction	$^{1}D(130) = .10$**	1.04	1.37	$D(189) = .09$**	1.41	1.64
Proactive problem solving	$D(130) = .09$*	1.34	1.00	$D(189) = .13$***	1.75	0.85
Exploration of positive experiences	$D(130) = .12$***	1.82	0.65	$D(189) = .11$***	2.00	1.37
Resignation	$D(130) = .09$*	0.19	1.81	$^{1}D(189) = .08$**	1.31	1.01
Psychological well-being						
Depression	$D(130) = .09$**	0.85	2.59	$D(189) = .20$***	10.23	10.03
Anxiety	$D(130) = .14$***	3.60	0.55	$D(189) = .28$***	12.51	14.89
Stress	$D(130) = .08$, n.s.	0.62	1.81	$^{1}D(189) = .07$*	0.44	1.83

(continued)

Variable	Clinical sample (n = 130)			Non-clinical sample (n = 189)		
	Kolmogorov-Smirnov-test	z-score skewness	z-score kurtosis	Kolmogorov-Smirnov-test	z-score skewness	z-score kurtosis
Sensory-Processing Sensitivity	$D(130) = .10$**	0.47	1.81	$D(189) = .04$, n.s.	0.13	0.44

Note. The table displays results of statistical tests of normality taking into account results of Table C1 (i.e., results of the transformation process). The following transformation methods were applied: logarithm transformation, square root transformation, 1/(variable)-transformation. Colored scores (i.e., grey) in the table represent those that reached or exceeded the threshold of 1.96.

*$p < .05$; **$p < .01$; ***$p < .001$. [1]Analysis realized based on the transferred data (i.e., the results of data transformation displayed in Table C1).

Table C3

Summary of Results Analyzing Normality of All Additional Clinical Variables in the Clinical Data Set

Variable	Kolmogorov-Smirnov-test	Z-score skewness	Z-score kurtosis
PHQ-Somatoform disorder at admission	$D(65) = .11$, n.s.	0.25	0.51
PHQ-Somatoform disorder at release	$D(65) = .13$*	2.13	0.53
PHQ-Depressive disorder at admission	$D(65) = .10$, n.s.	0.81	0.14
PHQ-Depressive disorder at release	$D(65) = .15$**	4.22	4.04
PHQ-Anxiety at admission	$D(65) = .16$***	1.07	1.40
PHQ-Anxiety at release	$D(65) = .16$**	5.78	9.07
GAF-two months before admission	$D(65) = .16$***	4.94	5.81
GAF-at release	$D(65) = .17$***	1.90	0.47
CGI-Improvement score	$D(65) = .28$***	1.13	0.93
BSI-Somatization at admission	$D(65) = .13$*	1.70	0.88
BSI-Somatization at release	$D(65) = .22$***	4.55	2.49
BSI-Obsessive-compulsive behavior at admission	$D(65) = .09$, n.s.	0.66	0.93
BSI-Obsessive-compulsive behavior at release	$D(65) = .14$**	4.39	3.38
BSI-Interpersonal sensitivity at admission	$D(65) = .14$**	2.05	0.98
BSI-Interpersonal sensitivity at release	$D(65) = .16$***	3.52	1.41
BSI-Depression at admission	$D(65) = .15$**	1.35	1.97
BSI-Depression at release	$D(65) = .19$***	5.22	4.13
BSI-Anxiety at admission	$D(65) = .10$, n.s.	2.38	0.35
BSI-Anxiety at release	$D(65) = .19$***	5.58	5.28
BSI-Hostility at admission	$D(65) = .14$**	2.52	0.28
BSI-Hostility at release	$D(65) = .26$***	5.38	3.24
BSI-Phobic anxiety at admission	$D(65) = .20$***	5.28	4.03
BSI-Phobic anxiety at release	$D(65) = .31$***	11.33	23.85
BSI-Paranoid ideation at admission	$D(65) = .13$**	3.61	1.48
BSI-Paranoid ideation at release	$D(65) = .19$***	5.30	4.86
BSI-Psychoticism at admission	$D(65) = .15$**	2.46	0.46
BSI-Psychoticism at release	$D(65) = .25$***	8.69	15.47
BSI-GSI at admission	$D(65) = .13$**	1.62	0.84
BSI-GSI at release	$D(65) = .15$**	6.58	9.08
BSI-PSDI at admission	$D(65) = .09$, n.s.	0.71	1.05
BSI-PSDI at release	$D(65) = .11$*	1.88	0.51
BSI-PST at admission	$D(65) = .07$, n.s.	0.90	1.38
BSI-PST at release	$D(65) = .17$***	5.48	5.22
Length of stay at clinic (in days)	$D(65) = .09$, n.s.	2.27	1.95
Incapacity for work across the last 12 months (in weeks)	$D(65) = .18$***	3.88	0.65

Note. Coefficients colored in grey represent those that deviate from a normal distribution. n.s. = not significant; PHQ = Patient Health Questionnaire; GAF = Global Assessment of Functioning; CGI = Clinical Global Impression; BSI = Brief Symptom Inventory; GSI = Global severity index; PSDI = Positive symptom distress index; PST = Positive symptom total.
*$p < .05$; **$p < .01$; ***$p < .001$.

Appendix D: Overview of Main and Secondary Diagnoses in the Clinical Sample

This section of the Appendix includes an extensive overview of all main and secondary diagnoses found in participants of the clinical sample. Results are displayed separately for both sensitivity groups (i.e., the high sensitive group and the low sensitive group). The respective data were available for 88 patients. While patients were only given one main diagnoses, up to nine secondary diagnoses were found across participants. However, the order and number of the particular secondary diagnoses were not considered in this table. Rather, all secondary diagnoses were treated equally.

Table D

Frequency of Patients' Main and Secondary Diagnoses for Both Sensitivity Groups Separately

Diagnosis	Low sensitive group (n = 38)	High sensitive group (n = 50)	Total
Main diagnosis			
F32.1	11	12	23
F32.2	0	6	6
F32.3	1	1	2
F33.1	16	16	32
F33.2	3	11	14
F40.01	0	1	1
F40.1	0	1	1
F41.0	0	1	1
F42.1	1	0	1
F42.2	1	0	1
F43.1	1	0	1
F45.0	1	1	2
F45.37	1	0	1
F50.8	1	0	1
F50.9	1	0	1
Secondary diagnosis			
A09.9	0	1	1
B18.2	1	0	1
C50.9	0	1	1
D17.9	0	1	1
D25.9	0	1	1
D33.3	0	1	1
D35.0	0	1	1
D50.8	0	1	1
D68.5	0	1	1
E01.0	0	1	1
E01.2	0	1	1
E03.9	1	3	4
E04.2	0	1	1

(continued)

Diagnosis	Low sensitive group (n = 38)	High sensitive group (n = 50)	Total
E04.9	0	2	2
E06.1	0	1	1
E06.3	1	2	3
E10.7	1	0	1
E10.72	1	0	1
E11.20	1	0	1
E12.81	1	0	1
E66.00	2	1	3
E66.01	1	0	1
E66.02	0	1	1
E66.20	1	0	1
E66.90	0	1	1
E66.91	0	1	1
E73.9	0	1	1
E74.8	0	1	1
E78.0	2	2	4
E78.2	3	1	4
E79.0	3	0	3
E83.58	1	0	1
E89.0	0	2	2
F10.1	0	2	2
F10.2	1	0	1
F17.1	0	1	1
F32.0	1	0	1
F32.1	1	1	2
F33.1	1	1	2
F33.2	1	1	2
F33.4	0	1	1
F34.1	1	2	3
F40.0	0	1	1
F40.01	0	2	2
F40.1	0	1	1
F40.2	0	1	1
F41.0	0	2	2
F41.1	1	0	1
F42.1	0	1	1
F43.1	0	1	1
F43.8	0	1	1
F45.1	0	1	1
F45.2	0	1	1
F45.31	0	1	1
F45.33	1	0	1
F45.41	1	0	1
F45.8	1	6	7
F50.0	0	1	1
F50.1	0	1	1
F50.8	1	1	2
F51.0	0	1	1
F60.3	0	1	1
F60.31	0	1	1

(continued)

Diagnosis	Low sensitive group	High sensitive group	Total
F60.5	0	2	2
F61.0	0	1	1
F90.0	2	0	2
G25.80	1	0	1
G43.0	0	1	1
G43.1	0	1	1
G44.1	0	1	1
G44.2	1	1	2
G47.31	0	3	3
G47.39	0	1	1
G51.0	2	0	2
G56.0	0	2	2
G57.1	1	0	1
H10.9	0	1	1
H40.0	0	1	1
H35.3	1	0	1
H71.0	1	0	1
H81.0	0	2	2
H81.1	0	1	1
H83.3	1	0	1
H90.3	0	5	5
H91.1	0	1	1
H91.2	0	1	1
H91.9	0	1	1
H93.1	1	12	13
H93.2	0	2	2
I08.0	0	1	1
I10.00	2	3	5
I10.01	1	0	1
I10.90	6	9	15
I25.19	0	1	1
I44.0	0	2	2
I65.2	0	1	1
I83.9	0	1	1
I85.9	1	0	1
J06.9	0	1	1
J30.1	0	1	1
J32.9	1	1	2
J42.0	0	2	2
J43.9	1	0	1
J45.0	0	3	3
J45.9	2	0	2
I49.9	1	0	1
K07.6	0	1	1
K13.0	1	0	1
K21.0	4	1	5
K25.9	1	0	1
K29.5	1	0	1
K40.20	1	0	1
K40.9	0	1	1
K51.9	0	1	1

(continued)

Diagnosis	Low sensitive group (n = 38)	High sensitive group (n = 50)	Total
K57.3	0	1	1
K58.0	1	0	1
K58.9	0	2	2
K64.2	1	0	1
K76.0	1	0	1
K76.8	0	1	1
K80.00	1	0	1
K80.20	1	0	1
K86.9	1	0	1
K90.9	0	1	1
K92.9	0	1	1
L02.2	0	1	1
L02.4	0	1	1
L30.1	1	0	1
L72.1	1	0	1
M16.1	1	0	1
M16.9	1	1	2
M17.0	1	0	1
M17.1	3	0	3
M17.3	0	1	1
M17.4	0	1	1
M20.1	0	2	2
M23.81	1	0	1
M23.33	1	0	1
M24.85	0	1	1
M24.87	1	0	1
M25.51	1	0	1
M41.99	0	2	2
M42.09	1	1	2
M42.90	1	0	1
M50.1	0	1	1
M50.2	0	1	1
M50.9	0	1	1
M51.2	0	2	2
M51.90	1	1	2
M54.10	0	2	2
M54.12	2	1	3
M54.16	0	2	2
M54.17	1	0	1
M54.2	0	1	1
M54.4	0	2	2
M54.80	0	1	1
M54.85	0	1	1
M54.2	2	0	2
M62.81	1	1	2
M62.88	4	1	5
M62.89	0	2	2
M62.98	0	1	1
M62.99	3	4	7
M70.6	0	1	1

(continued)

Diagnosis	Low sensitive group (n = 38)	High sensitive group (n = 50)	Total
M75.3	0	1	1
M75.4	1	0	1
M77.1	0	1	1
M79.10	1	0	1
M79.15	0	1	1
M79.18	0	4	4
M79.19	0	1	1
M79.67	0	1	1
M80.98	0	1	1
M81.0	0	1	1
N39.0	0	1	1
N39.3	0	1	1
N39.42	0	1	1
N40.0	0	2	2
N41.9	1	0	1
N76.0	1	0	1
N80.1	1	0	1
N80.3	1	0	1
Q65.8	0	1	1
R03.0	1	0	1
R10.3	1	0	1
R15.0	0	1	1
R52.2	0	1	1
R74	1	0	1
R74.8	0	1	1
R82.8	1	0	1
S76.1	0	1	1
S83.53	1	0	1
S90.88	0	1	1
S86.0	0	1	1
S92.4	1	0	1
S93.6	0	1	1
T78.1	1	0	1
T78.4	0	1	1
Z56.0	1	0	1
Z73.0	0	3	2
Z86.4	0	1	1
Z87.3	0	1	1
Z90.7	0	1	1
Z96.65	1	0	1

Note. Diagnostic codes are based on the ICD-10 (WHO, 2004).

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